DOCUMENT RESUME

ED 181 285 CE 023 821

TITLE	Planning Design for Conducting a National Survey of the Differential Cost of Vocational Education. Final Report [and] Executive Summary.
INSTITUTION	Educational Management Services, Inc., Minneapolis, Minn.
SPONS AGENCY	Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.
PUB DATE	Dec 79
CONTRACT	300-78-0524
NOTE	245p.; Best copy available.
EDRS PRICE	MF01/PC10 Plus Postage.
DESCRIPTORS	*Data Collection; Handicapped; Methods; *Models; *National Surveys; Operations Research; Planning; Postsecondary Education; *Program Costs; *Sampling; Secondary Education; *Vocational Education

ABSTRACT

A study was conducted to develop a comprehensive program costing model for vocational education. This model produced a comparison between the cost of operating a given vocational program and the average aggregate cost of operating all basic education programs. The model is applicable for both the secondary and postsecondary level programs and can distinguish costs among different types of institutions. A second major goal of the study was to field test the forms and procedures of the model as well as any new forms and procedures develcped as a result of the modification made for the education of the handicapped. A third goal was to define an appropriate sampling procedure for conducting a nationwide survey. Instrumentation and procedures were field tested at nine pilot sites. Methods of data collection were tested to determine the receptivity and burden upon the local school agencies (LEAs) and to determine the accuracy of data collected. A sampling plan for conducting a nationwide survey was developed, and burden-and-cost estimates for conducting a nationwide survey were projected. (Detailed results of the field test and the development of the sampling plan are included in this final report.) Some of the conclusions were as follow: the differential cost model is a complicated but appropriate means for determining cost differentials: data collection burden upon LEA personnel is directly related to type of data collection strategy utilized; and level of program cost aggregation will significantly affect cost-and-burden estimates for conducting a national survey. (BM)

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FINAL REPORT

PLANNING DESIGN FOR CONDUCTING A NATIONAL SURVEY OF THE DIFFERENTIAL COST OF VOCATIONAL EDUCATION

(CONTRACT #300780524)

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NATIONAL INSTITUTE OF EDUCATION

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CE 023 821

DECEMBER, 1979

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I. INTRODUCTION

1.1 OVERVIEW OF THIS DOCUMENT

This final report document describes the work completed by Educational Management Services, Inc. (EMS) under Contract Number 300780524 for the Bureau of Occupational and Adult Education (BOAE) of the United States Office of Education (USOE). The report is divided into seven major parts. Chapter I, Introduction, contains background information about the project together with an identification of the anticipated end products. Chapter II, Modifications to the Differential Cost Model, describes various modifications which were made to the original model developed by the Institute of Educational Finance (IEF). The major modification was development of a system for deducting handicapped education costs from basic education costs. The field testing of forms, procedures, and data collection strategies are described in Chapter III. The results of the data collection efforts at the nine pilot sites are also reported in this chapter.

One of the major tasks of the project was to develop a nationwide sampling methodology. This plan for sampling is contained in Chapter IV. Chapter V contains the forms and procedures which were tested for data collection at the nine pilot sites. Chapter VI, attempts to estimate the burden of data collection effort upon Local Education Agency (LEA) personnel as well as the level of assistance required from a contractor. This chapter also includes a general discussion of major requirements of a national study along with estimated costs and suggested timeline. Chapter VII presents a summary of the major findings of the study along

with recommendations concerning the implementation of the nationwide survey.

1.2 BACKGROUND

Knowledge about the nature of programs suggests that different educational opportunities may cost different amounts -- some programs are extremely expensive; others, by comparison, would be relatively inexpensive. While the above has been known and probably accepted since formal education first appeared, it was probably not until the late 1960's and early 1970's that a major formalized effort was made to determine educational costs. This effort, the National Educational Finance Project, sponsored by the USOE, opened new interest in the area of school finance, and since then numerous studies of school finance have emerged.

In 1977, IEF under USOE Contract Number 300760410 developed a model for determining the differential costs of vocational education programs. That model formed the basis for the present study. The work done by IEF was concerned primarily with "model building", whereas the present study made certain modifications to the model and developed plans to apply the model in a nationwide survey to determine the differential cost of vocational education.

1.3 SCOPE OF THE STUDY

This study assumed the development of the IEF differential cost model and hence started from that point. It did not attempt to "re-invent" the model but only to make certain prescribed modi-

fications. Thus, this document does not describe differential cost methodology in detail and readers are referred to IEF documentation for that purpose. The planning study was to be a extension of the IEF model, to make certain modifications, and to develop and test procedures for conducting a nationwide survey. Specifically, the major objectives of the study were:

1) To review in detail previous added cost models and methodology, especially the model developed by IEF and to develop procedures for collection of data.
2) To determine the data availability from local and state agencies which can be used in support of the differential cost model.
3) To develop a modification to the IEF model which will allow for the removal of costs associated with programs for the handicapped prior to calculation of basic costs.
4) To develop with advice and cooperation from the participating state and local agencies, a data collection procedure which will have at a minimum the following characteristics:
   a) Identification of costs for various vocational education courses and programs at the school, institution, and state levels.
   b) Identification of these costs within the framework of Handbook II and Handbook VI and the IEF model.

c) Identification and comparison of costs for vocational education courses and programs to "basic" or "academic" programs.

d) Identification of vocational costs on the basis of full time equivalent (FTE) students within program classifications.

e) Identification of costs in terms of direct and indirect expenditures according to the IEF model.

f) Identification of procedures for implementation that can be commonly understood and used by state and local agencies.

5) To cooperatively involve the participating state and local agencies in design, field testing and review of the data collection procedures, forms, and calculational procedures.

6) To field test the data collection procedure in a variety of situations at a minimum of nine sites for institutions with diverse programs and data bases.

7) To fully document the procedures, including sampling design, forms, estimated resources requirements, and time demands.

The study was divided into three main phases. Phase I was a planning and developmental effort and included work tasks related to: establishing operational criteria as reference points for the planning design; modifying the original methodology to accommodate a handicapped "deduct" system; conducting a field

test of the handicapped modifications; defining the universe of LEA's which offer vocational programs; developing statistical criteria for the sample; defining data elements to be collected locally and the procedures to be used; and developing a criteria for selecting nine sample sites. The second phase of the project was concerned with field testing of the various products developed during Phase I. The types of work tasks that appeared in Phase II were: securing participation of sample sites; conducting orientation sessions for participating LEA personnel as to model specifications and data collection requirements; collecting data from LEA's; validating data collected; and, revising and modifying forms and procedures based upon the field test. Phase III was concerned with reportage and documentation. Work tasks in this phase were related to: analysis of the sample data; development of cost and burden estimates upon local agencies for collecting data; and documentation of activities in a final report document.

1.4 PRODUCTS OF THE STUDY

During the course of the study, eighteen "working papers" were produced. These have been refined and condensed into three main products: 1) Final Report; 2) Executive Summary; and 3) Abstract. The final report is arranged around five subproducts, each of which constitutes a separate chapter. These subproducts are: 1) Modifications to the differential cost methodology; 2) Field test results; 3) Nationwide sampling consideration; 4) Recommended data collection forms and procedures; and 5) Burden estimates for the national sample. In addition, a Summary and Recommendations chapter is also included.

The major focus of this study was to define a process for conducting a nationwide study. While the pilot study also produced some actual cost data, it should be noted that these cost data are based on only nine sample sites and should not be used to estimate the universal costs of vocational education.

II. MODIFICATIONS TO THE DIFFERENTIAL COST MODEL

2.1 INTRODUCTION

The Request for Proposal (RFP) issued by USOE specified a modification to the differential cost model shall be made to allow for the deduction of costs related to handicapped education. In addition to this area, it also appeared that, in at least some instances, the cost of compensatory and adult education should also be deducted. Thus, not only was a deduct system established for handicapped education, but also similar systems were established for other areas as well.

While the original model allowed, in theory, the calculation of costs per Full Time Equivalent (FTE) student down to the course level, data were collected and assembled only at major vocational program levels (01.00.00 Agriculture, etc.). In discussions with the Project Officer, EMS agreed to attempt to determine differential costs at the subprogram level (01.01.00 Agriculture Production) as defined in Handbook VI. This chapter discusses these modifications with major emphasis given to the system for deducting handicapped education costs. For purposes of this study the words handicapped and special education are used interchangably.

2.2 HANDICAPPED EDUCATION MODIFICATION

2.2.1 Background

There are several critical issues which need attention in attemping to determine costs of education the handicapped, and in utilizing these costs as a deduct for purposes of clarifying the cost of "basic" education. Among these are: (1) the diversity in state and local organizational

and fiscal approaches as related to determing costs of educating the handicapped; (2) the differences between states in defining who are the handicapped; (3) the need to consider identifying the costs of educating the handicapped within vocational education as well, and (4) the problem of "overburden" associated with identifying the costs of special education.

The first of these, the diversity in organizational and fiscal approaches within what is commonly known as "Special Education", confounds the problem of identifying costs. While this problem is related to the overall diversity of practice in organizing and operating schools, there are some unique problems related to special education organizations and to determining costs of educating the handicapped. For example, there is a lack of agreement between states on which costs or expenditures are properly classified as special education costs. In one state, school social workers and psychologists may be considered appropriate costs, while in another, they may not.

Also, while there is reasonably good agreement on the definition of an "elementary" school, it is not always easy to define and separate in practice the related costs of education the handicapped within the regular education system. The recent trend toward "mainstreaming" of the handicapped, where most handicapped persons are now educated in the mainstream with the support of direct part-time special instruction and with ancillary services, makes it even more difficult to sort

out costs into "basic" and "regular". In the past where most of the handicapped were educated in special classes and/or schools, and where integration with the so-called regular education systems was minimal, the problem of determining to some reasonably finite degree the costs of educating the handicapped was much less complex.

The second major issue, in addition to the problem of organizational diversity, is that of lack of agreement on defining the handicapped. While this issue is addressed in more detail in Section 2.2.3, it is important to note that this issue is directly related to an appropriate determination of special education costs. For example, students considered handicapped in one state may not be in another. Examples where states differ are the eligibility of teenage mothers and of the socially maladjusted. While a uniform definition of the handicapped can be imposed or suggested, there will be LEA's which will either not agree with this "uniform" definition, and/or which will have a difficult time relating to it in terms of cost determination.

The third issue, in addition to identifying and deducting the cost of educating the handicapped from basic education, is the need to identify the cost of educating the handicapped special needs population within vocational education programs, and to deduct these costs from "basic" vocational education programs. Given the primary purpose of the proposed national survey (that being to determine and compare vocational education costs with "basic" education costs), and given the associated stipulation that handicapped education

costs be deducted from "basic" costs, there appears to be a need to isolate and also deduct special needs costs from vocational education costs if an accurate comparison of basic and vocational costs is to be made.

The fourth issue relates to the need to keep local survey site data collection and recording "overburden" to a minimum. Obviously, any constructive response to a survey process/instrument will require local effort, but the data requirements will have to be realistic, and the process and instrumentation kept reasonably simple so as to not unduly inhibit survey site response.

Although the basic to vocational education cost comparison requires that handicapped education costs be deducted, a rigorous degree of accuracy in determining handicapped education costs does not seem to be necessary. Even if no handicapped education costs were deducted, the maximum error in determining "basic" costs would range from about five to ten percent as this is the typical range of the proportion of special education related expenditure to the total LEA expenditure. Thus, even in a LEA where the handicapped education expenditure, if anayzed in finite detail, was ten percent of toal expenditures, a twenty percent error in determining costs of handicapped education would result in only a two percent error in determining basic education costs. Further, when this hypothetical two percent error is converted into FTE student dollars, the real impact on a valid comparison between costs of basic education and vocational education would be minimal. At the lower end of the scale, a twenty

percent error in estimating costs of special education, where the total handicapped education expenditure was five percent of the total expenditure, would only amount to a one percent error in determining the costs of basic education.

In a comprehensive secondary school, the maximum error possible given any error in determining handicapped education costs is less than if the basic education comparison base were K-12 costs. This phenomenon is due to the fact that a disproportionate amount of total dollars spent for handicapped education has historically been spent to develop services at the elementary level, with proportionately less spent at the junior and senior high levels. For example, in distribution of special education dollars on a student enrollment basis, assuming an equal distribution of students from grades 1-12, each grade should receive one-twelfth of the resources. The elementary grades would thus receive 50 percent of the total, the junior high grades 25 percent, and the senior high grades 25 percent. In practice, however, the typical distribution has been closer to 65 percent elementary, 20 percent junior high, and 15 percent senior high.

This skewing to the elementary grades of handicapped education costs, coupled with the fact that the cost of "basic" education at the secondary level is higher than at the elementary level, means that, in a district where 10 percent of expenditures overall are for handicapped, secondary level handicapped education expenditures would likely be from three to five percent of total secondary expenditures. A twenty percent error in identifying handicapped costs at this level

would result in a less than one percent error in determining the cost of basic education. Further, in postsecondary institutions, expenditures devoted to handicapped education generally constitute a smaller proportion of total expenditures than in secondary schools and hence, the percentage of error would be proportionally smaller.

From the several issues discussed in this section, two assumptions are germane:

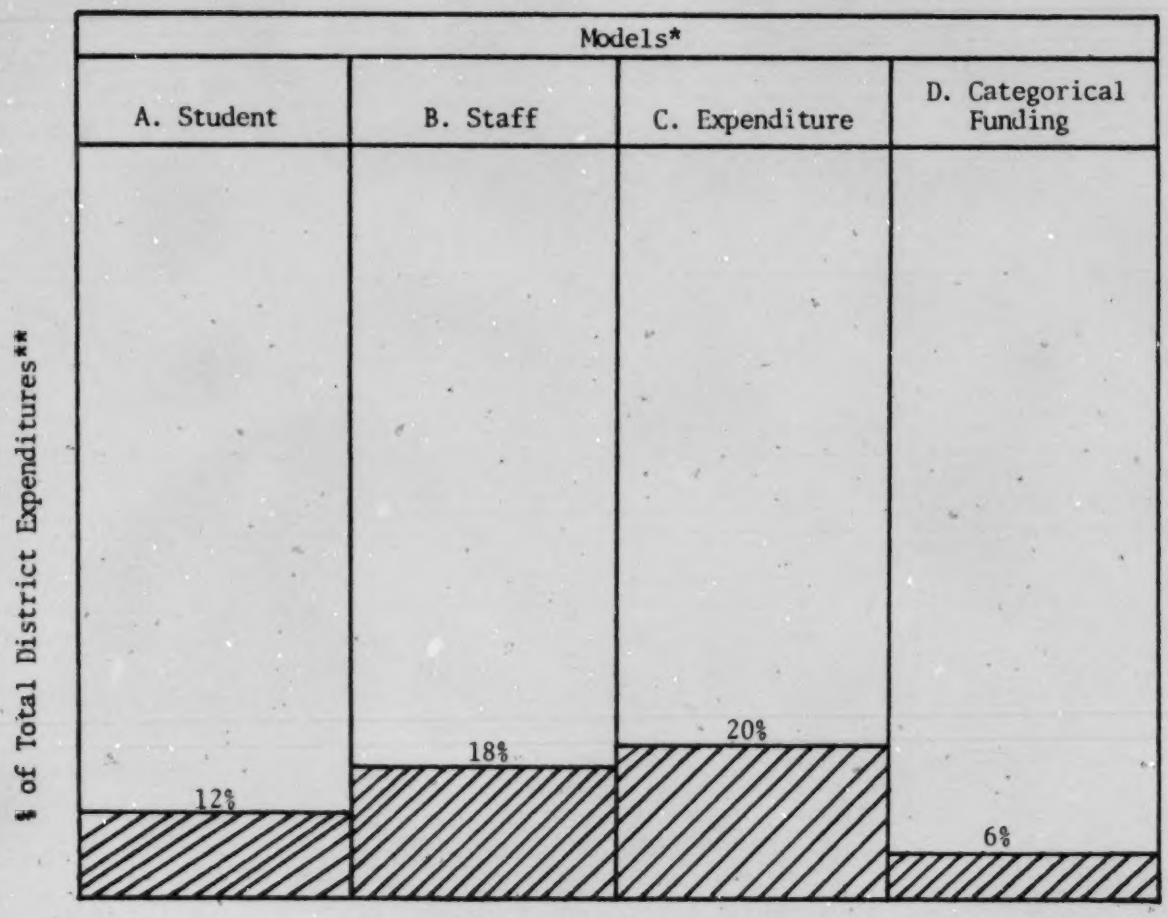
- As the primary purpose in determining special education costs is to deduct them from the cost of basic education, and not to determine the excess cost of educating the handicapped, a finite level of accuracy is not required, and a 10-20% error in estimating costs of educating the handicapped can be tolerated in the interest of reducing data collection burdens.
- If costs of educating the handicapped are to be deducted from overall costs for "basic" program, then costs of educating the handicapped within vocational education programs should also be deducted prior to establishing a vocational education/basic education cost ratio.

2.2.2 Determining Handicapped Education Costs

Several approaches to determining special education costs are depicted in Figure 2.1. Each of these are more or less useful depending on several variables. Among these variables are the following:

Figure 2.1

COMPARISON OF SEVERAL MODELS FOR DETERMINING SPECIAL EDUCATION COSTS



* A = Ratio of FTE Special Ed. students to ADM Students
B = Ratio of FTE Special Ed. Staff to FTE Basic Education Staff
C = Recorded Expenditures or Adopted Budget for Programs/Services for the Handicap.
D = Total of Federal and State Categorical Aids for Programs for the Handicapped

** Relative approximations, assuming that actual expenditures for special education are 20% (Model C) of total district budget. As costs would rarely be this high, this % figure is used for illustrative purposes only.

1. The special education expenditure per FTE handicapped student.

2. The per FTE student expenditure in general education.

3. The degree to which the special education program is operated at optimum rather than maximum load at the direct service level.

4. The type and scope of state subsidy for special education.

5. The type, extent and scope of indirect specialized services and resources available to special education direct service staff.

6. The degree to which special education expenditures are dedicated, managed, and monitored by one accountable administrator.

While the purpose of this discussion is not to analyze each of the several models in terms of all of the above variables, some analysis in selected areas is necessary in order to select a model for use in this particular application.

Of the models depicted by Figure 2.1, models "A" (Ratio of FTE Special Education Students to ADM Students) and "D" are generally the least useful. Model "A" is generally not accurate as the cost for educating one handicapped FTE student is much higher than that for one "regular" or non-handicapped student. (See variable 1.) Thus, this model will almost always underestimate the cost of educating the handicapped. In addition, the cost estimate generated by this model is greatly influenced by variations in variables 2, 3, and 5. En toto, Model "A" might come close to estimating the cost in a few situations, but would generally result in major underestimations of actual cost.

Model "D" (Total of Federal and State Categorical Aids for Programs for the Handicapped) would also result in an

underestimate of actual costs, in that, across programs, some portion of the total cost for special education is usually borne by the local tax base. The degree to which Model "D" would come close to approximating actual cost is contingent on variable 4, the type and scope of state subsidy for special education programs. Where this subsidy is quite high, Model "D" would come close to approximating actual cost. Where the subsidy is low, the amount of under-estimation would be greater.

Model "B" is more capable of approximating actual costs, as education of the handicapped is, as is education in general, a staff-intensive activity. Staff generally represent from 65 to 80 percent of total expenditures, depending in part on the proportion of variable five which is non-staff in nature.

Model "C", Actual Recorded Expenditures, is obviously the most accurate model. However, there are several problems associated with this model. Notable among them are: 1) the fact that it is not always possible to agree on which costs or what proportion of costs should be considered special education as opposed to regular education; 2) the fact that school districts do not always have a uniform and comprehensive system for identifying special education expenditures; 3) the problem of assigning both general and special education indirect costs to programs; and 4) the potential for this model to be time and resource burdensome at the survey site level.

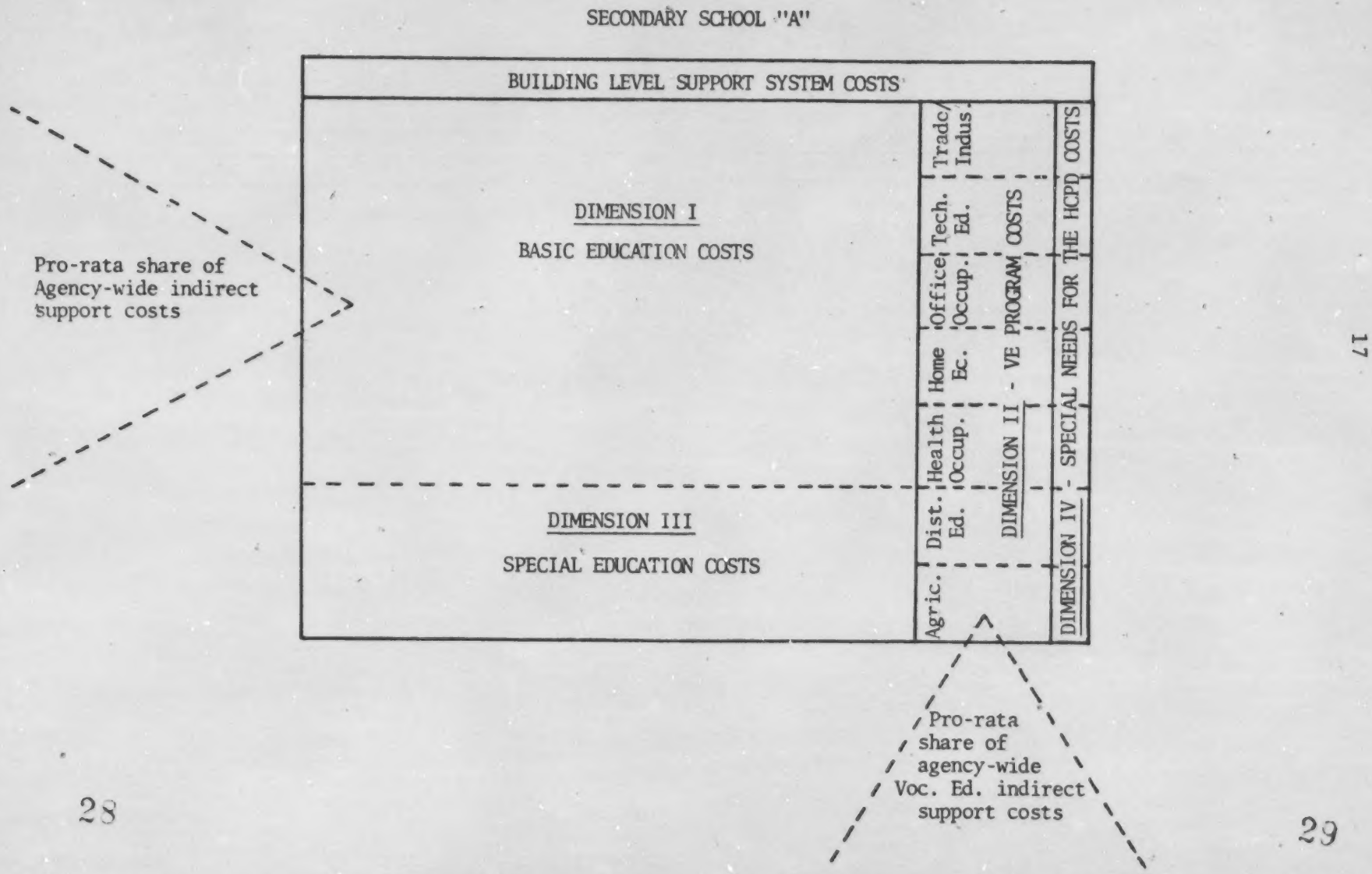
A related problem is that an adaptation of the expenditure model will have to be made for each separate application -- those applications being:

1. Special Education Costs related to Secondary Special Education students.
2. Special Education Costs related to Secondary Vocational Education.
3. Special Education Costs related to Postsecondary Technical school special needs students.
4. Special Education Costs related to Community and four-year college non-vocational handicapped students.
5. Special Education Costs related to Community and four-year college handicapped vocational special needs students.

Figure 2.2 depicts program and cost dimensions for secondary school programs. (Other levels could be considered in a similar context.) There are four basic dimensions to consider -- Basic Costs, Vocational Education Costs, Special Education Costs, and Special Needs for the Handicapped Costs. The purpose of this cost determination process is to identify and separate from both basic and vocational costs those costs which are considered attributable to the handicapped. In this illustration, a single secondary school building (cost center) is analyzed. Dimension III and IV relate to handicapped costs which must be deducted from the overall costs to arrive at a cost of basic education. In addition to the direct costs of Dimension III and IV, indirect costs also need to be considered and are represented by agencywide indirect and vocational division indirect to special needs programs only. This total

Figure 2.2

PROGRAM AND COST DIMENSIONS FOR SECONDARY SCHOOL PROGRAMS RELATED TO THE DIFFERENTIAL COST MODEL



cost then represents the amount to be deducted. (The forms and procedures which actually define the data to be collected are contained in Chapter V of this report.)

2.2.3 Definitions of the Handicapped

Definitions of "who are the handicapped" are found at all levels of government and have often been characterized by the lack of consistency or uniformity. Historically, each state legislature and/or the State Educational Agency has, for purposes related to public education, defined the handicapped on its own terms related to the substance and scope of legislative intent. Thus, a great deal of variance exists between states on definitions related to the handicapped.

Recently, however, some uniformity has been imposed by the passage of P.L. 94-142, and by P.L. 93-112, Section 504. The first of these relates to provision of federal support for public education of the handicapped, and the latter to non-discrimination protections for the handicapped. In addition, the Vocational Education Law, P.L. 94-482, provides a federal definition of the handicapped for vocational education purposes. The current trend at the state level is for state law and regulation to be adopted to conform with, for purposes of public education, P.L. 94-142.

The several federal definitions referenced above are listed below:

P.L. 94-482 DEFINITION

> "Handicapped" means a person who is mentally retarded; hard of hearing; deaf; speech impaired; visually handicapped; seriously emotionally disturbed; orthopedically impaired; or other health impaired person, or persons

with specific learning disabilities; and who by reason of the above:

- Requires special education and related services, and,
- Cannot succeed in the regular vocational education program without special educational assistance; or,
- Requires a modified vocational education program.

P.L. 94-142 DEFINITION

"Handicapped children" means those children evaluated as being mentally retarded, hard of hearing, deaf, speech impaired, visually handicapped, seriously emotionally disturbed, orthopedically impaired, other health impaired, deaf-blind, multihandicapped, or as having specific learning disabilities, who because of those impairments need special education and related services. The terms used in this definition are defined as follows:

- "Deaf" means a hearing impairment which is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, which adversely affects educational performance.
- "Deaf-blind" means concomitant hearing and visual impairments, the combination of which causes such severe communication and other developmental and educational problems that they cannot be accommodated in special education programs solely for deaf or blind children.

- "Hard of hearing" means a hearing impairment, whether permanent or fluctuating, which adversely affects a child's educational performance but which is not included under the definition of "deaf" in this section.
- "Mentally retarded" means significantly subaverage general intellectual functioning existing concurrently with deficits in adaptive behavior and manifested during the developmental period, which adversely affects a child's educational performance.
- "Multihandicapped" means concomitant impairments (such as mentally retarded-blind, mentally retarded-orthopedically impaired, etc.), the combination of which caused such severe educational problems that they cannot be accommodated in special education programs solely for one of the impairments. The term does not include deaf-blind children.
- "Orthopedically impaired" means a severe orthopedic impairment which adversely affects a child's educational performance. The term includes impairments caused by congenital anomaly (e.g., clubfoot, absence of some member, etc.);

fears associated with personal or school problems.

The term includes children who are schizophrenic or autistic. The term does not include children who are socially maladjusted, unless it is determined that they are seriously emotionally disturbed.

- "Specific learning disability" means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations. The term includes such conditions as perceptual handicaps, brain injury, minimal brain disfunction, dyslexia, and developmental aphasia. The term does not include children who have learning problems which are primarily the result of visual, hearing, or motor handicaps, of mental retardation, or emotional disturbance, or of environmental, cultural or economic disadvantage.
- "Speech impaired" means a communication disorder, such as stuttering, impaired articulation, a language impairment, or a voice impairment, which adversely affects a child's educational performance.

the handicapped student with another "regular" student in a given class setting. If a science classroom normally has 30 students, and if this particular classroom in question has 27 regular and three students who require special education, one could count the handicapped FTE's from zero to three depending upon the situation and the philosophy used to establish the count. For example, if the three handicapped students were placed in a special program, and if as a result of removing the handicapped students, three new students could then be accommodated in the classroom (replacement criteria) then it might be concluded that there are three handicapped FTE's. On the other hand, if the three students would stay in the regular classroom with the assistance of an aide, or if the students were removed from the classroom for only a brief time, without a replacement (chairs are empty) then, using this methodology, all basic costs would continue and therefore the students should not be counted as handicapped FTE's. If they were, there would be an inflated overall FTE count (handicapped plus regular).

Some states, such as Utah, have a means of counting FTE handicapped students for aid purposes. These systems of counting may or may not correspond to either of the counts described above. However, based upon experience at one sample site, the state aid count could be converted to fit the method required for this study which is described in the next section.

For purposes of this study, handicapped FTE's were counted according to the replacement criteria. Thus, for any handicapped student served in a self-contained setting, or where the handicapped student could be removed a sufficient amount of time

from the regular classroom so that a "replacement" student could be served, an FTE was assigned. Likewise, no handicapped FTE's were assigned to mainstreamed handicapped students who were either served while in their regular classroom setting or for handicapped students who received supplemental help outside the classroom but where their place remained unoccupied during their absence.

The two means of counting handicapped FTE's described above would give rise to different FTE counts and hence would influence the calculations used in the differential cost model. In general, the replacement count method will produce a smaller FTE count and would thus "deduct" fewer handicapped FTE's from the number of basic FTE's. The effect of this would be to produce a basic cost estimate per FTE which is slightly lower than if a larger number of handicapped FTE's had been used. Since the cost differential is calculated on the difference between vocational and basic costs, a lower basic cost will then create a larger value for the differential.

2.3 COMPENSATORY EDUCATION MODIFICATION

While the RFP explicitly required the handicapped deduct modification, it suggested compensatory and other deducts only by example and this within a definition for basic education. For example, page 2 of the RFP work statement indicated that one of two major objectives is the handicapped deduct modification. However, the RFP does not mention compensatory education until page 10, item H, where it defined basic program cost to exclude program costs such as "vocational education, special education, and compensatory education". Using what appears to be the intent of the RFP, EMS developed a compensatory deduct system modeled after the handicapped system.

The procedures followed by EMS in developing the compensatory deduct were very similar to those used for special education and will not be repeated here in detail. The definition used for compensatory education was taken from the Financial Accounting Handbook II, Revised, Instructional Account, item 1250, Programs for the Culturally Different. The definition is as follows:

> "Special learning experiences for pupils whose background is so different from that of most pupils that they need additional educational opportunities beyond those provided in the usual school program if they are to be educated to the level of their ability."

Some specific program descriptors in this broad area are: Title I, Bilingual Education, Migrant Education, and Compensatory Education. At the pilot test sites, these types of programs were found only in the secondary school systems and it appears that few, if any, of these programs would be found at the postsecondary level.

Staff and financial accounting procedures for compensatory education follow those established for special education and are defined in detail in the data collection forms contained in Chapter V. Student accounting also follows the same logic as does special education. The replacement criteria were applied to count compensatory FTE students. For the sample LEA's all of these types of programs were found to follow the "mainstreaming" concept of special education. Thus, no FTE student counts were made for purposes of reducing the number of basic education students in the sample LEA's. However, all compensatory expenditures as given by the previous definition were used to reduce the costs of non-vocational education. Since many of these types of programs are confined to the elementary level, this portion of the deduct system can be ignored for purposes of computing differential costs.

2.4 ADULT EDUCATION AND OTHER SPECIALIZED PROGRAMS

It appeared to be the intent of the RFP to isolate the costs of vocational and basic education such that a differential cost could be computed. To do this it appeared reasonable to define vocational and basic education as specifically as possible to exclude any non-relevant costs. The RFP spoke to two areas of non-basic education costs; special education and compensatory education. The IEF model defined basic education programs in secondary and postsecondary schools as follows:

Basic Program Secondary Schools

> "Every course and activity in the secondary school instructional program, as locally defined, except specialized programs (such as vocational education, special education and/or compensatory education) comprise the basic program."

Basic Program Postsecondary Schools

> "Every course which is designed by the local institution to qualify as a transfer credit to a four-year institution but excluding any credit course which is considered a part of the vocational-technical program (USOE course numbers will be the basis for this determination)."

When applying these definitions, especially the definition regarding secondary schools, it was sometimes found that adult education activities were included in the same expenditure categories as regular secondary vocational programs. For this reason, EMS developed an adult education deduct form and procedures. The purpose of this system is simply to separate out those costs of education, in the case of adult education, which are not appropriate to be included in either the secondary vocational expenditures or in the basic program for grades 7-12. The specific forms and procedures for this deduct system are found in Chapter V.

This same procedure could be applied to any other specialized programs which are not normally part of the secondary or postsecondary school system, but which may be operated by the school system. For example, many LEA's operate some type of community education program. Usually, these expenditures are clearly identified, but if it were found that such expenditures were comingled with regular vocational expenditures or with basic expenditures, the procedures outlined in the adult education modification could be used to extract those expenditures and to separate out costs of vocational and basic education.

2.5 PROGRAMS/SUBPROGRAM DIMENSION

The Insitutute for Educational Finance (IEF) Model provided a means to analyze differential costs at varying levels of detail. Analysis could be completed to the course level; however, the analysis reported by the IEF project and also recommended by the IEF project was at the program level (01.00.00 Agriculture). The RFP specified that the planning study would be directed towards analysis at the subprogram level (01.01.00 Agriculture Production as opposed to 01.00.00 Agriculture). This change, in itself, did not cause any problems nor require any specific modification to the model developed by IEF. However, in practice it does require that a different level of detail be applied to collection of data from the LEA's. For example, under the aggregate analysis performed by IEF it was necessary only to know if the vocational expenditure belonged to the Agriculture category or the Trade and Industrial program category, etc. Under the analysis performed by EMS it was necessary to know not only that the expenditure belonged to the Agricultural program area, but also that it belonged to the Agriculture Production area within the overall Agricultural program. The net effect of this was to compound the time and efforts

required for data collection, especially for collecting data on items which were not clearly distinguishable at the subprogram level. For example, under a program aggregation model, the cost associated with the vocational administrator, say the Director of Vocational Education of an LEA, would be proportioned across the main aggregate program areas, such as Agriculture, T & I, etc. However, with the subprogram model those same costs now need to be apportioned not only across the program levels but also to the subprogram levels (e.g., to Agriculture Production within Agriculture and Welding within the T & I program area, etc.). These same statements are true in the student accounting area as well as the financial accounting area. Under the subprogram model additional detail must be known about the student and adds to the data collection burden at the LEA level.

III. FIELD TEST RESULTS

3.1 INTRODUCTION

The RFP specified nine pilot sites to be used as a field test. There were several purposes of the field test. First, was to determine the feasibility of LEA's using the forms and procedures developed for data collection. Second, the field test provided a means of developing preliminary estimates of the data collection burden upon LEA's. A possible third purpose was to obtain actual differential cost data. While the collection of these data were accomplished, and are accurately reported, one must also be cautioned that in no way was the field test designed to produce any representative sample of costs and hence, no generalizations should be inferred from the results reported in this chapter.

3.2 METHODS OF DATA COLLECTION

The RFP issued for this project did not specify a means of data collection to be tested for the nationwide survey. Review of the IEF model indicated all data were collected using trained data collectors. Through discussions with the Project Officer, EMS agreed to attempt four types of data collection across the sample sites. The purpose of this plan was to determine: 1) The reaction of LEA's to each of the methods; 2) The influence, if any, of the methods upon the accuracy of the data; and 3) The influence of the methods upon the cost and burden

projections of a nationwide survey. The four methods proposed by EMS were as follows:

1) Paper/Pencil Survey - All data would be collected from sample sites via the sites completing the forms according to specified procedures. The only contact with EMS would be to answer questions by telephone.

2) Off Site Training of LEA Personnel - This method would bring one or two persons from each site to a central location for training for one or two days. The training would include explanation of the model, forms, procedures, and data collection techniques necessary for LEA personnel to collect needed data.

3) On Site Facilitator - This method is a combination of (2) above and (4) below. An EMS person, trained in data collection, would visit each site for no more than one day. During this time, a specialized version of the training in strategy (2) would be presented, along with "getting the local personnel started". This model assumes the training could be individualized to the site and many more specific questions would be answered. Depending upon the complexity of the situation, the facilitator could return for a second visit, probably after completion by the local personnel.

4) Trained EMS Data Collector - Using this strategy, an EMS person, trained in data collection, would actually perform most of the data collection and would physically stay at the site until the data collection process was completed.

Table 3.1 presents some of the initial assumptions about each of the data collection strategies. To a large extent, the assumptions proved true. However, one of the unanticipated outcomes was the difficulty, in fact refusal, on the part of LEA's to participate in the paper/pencil survey methodology. Initially LEA's were informed of the four data collection strategies with the expectation that at least one or more would elect to participate in the paper/pencil strategy. Following the inability of EMS to secure LEA participants willing to use this method, other LEA's were approached as if the paper/pencil survey were the only method of participation. Several LEA's refused verbally to participate after a general description of the requirements was given. However, two institutions tentatively agreed to participate and were provided the materials. Both withdrew after review of the materials. The general reason given for refusal or withdrawing was that the process was too complicated and time consuming. The end result was that no LEA's participated in the paper/pencil method.

The other three methods of data collection proved much more successful. Three LEA's participated in the strategy of sending LEA personnel to a central location for training, four LEA's participated in the on site facilitator model, and two LEA's participated in the process where a trained EMS data collector visited the sites and collected data while on-site. Table 3.2 provides a summary of the results from the strategies outlined in Table 3.1 based upon the experiences of the nine

Table 3.1

ASSUMPTIONS ABOUT POSSIBLE DATA COLLECTION STRATEGIES FOR PILOT SITES

Survey Consideration	Paper/Pencil Survey	Off Site Training of Site Personnel	On Site Facilitator	Trained EMS Data Collector on Site Visitations
1. Cost of conducting survey	Minimal Cost - materials, postage, follow-up only costs.	Median Cost - (assuming not paying person for time). Travel expense to training site, cost of instructors with travel - could train in 2 days or less.	Median to Maximum - depending upon the amount of time spent on site and number of trips.	Maximum Cost - assume paid auditor visit each site - travel, salary, etc.
2. Time required for data collection (contractor)	Minimal - all could be sent at once but completion could not be controlled.	Median - training could be completed within a relatively short time - but completion could not be controlled.	Median to Maximum - assumes at least one day of site visit for each institution.	Maximum - assuming a small number of auditors process would be time consuming - travel time would be lost.
3. Forms and procedures development	Maximum - very explicit because little or no interaction.	Median - opportunity for interaction, interpretation, etc.	Median - probably same as training model - opportunity for interaction.	Minimal - auditor could direct entire process - need only outline of process.
4. Burden upon local agencies	Maximum - assuming time for reading of forms - study difficulty in solving problems.	Median - assuming time spent in training session would make for more efficient data collection.	Median - probably about the same as training model, but could be more efficient.	Minimal - auditor could direct entire process - need only assistance from local personnel.
5. Reliability/ validity of data	Minimal - complex task requiring many interpretations and would be difficult to provide explicit directions.	Median - assuming the interaction of the training session would help.	Median to Maximum - if follow-up visits are made, it could approach the Trained Data Collector model.	Maximum - quality control would be maintained by auditor.
6. Response rate	Minimal - because of lack of control - even if preselected, no way of controlling for final response.	Median - assuming if agree to training, most will complete task.	Median to Maximum - follow-up visits could be made to help insure completion.	Maximum - if site agrees to participate, the auditor controls completion.

Table 3.2

RESULTS OF DATA COLLECTION STRATEGIES ATTEMPTED WITH NINE PILOT SITES

Survey Consideration	Paper/ Pencil Survey	Off Site Training of Site Personnel	On Site Facilitator	Trained EMS Data Collector on Site Visitations
1. Cost of conducting survey		Lowest initial direct cost to contractor of three but because of follow-up requirements not necessarily substantially lower.	Lower initial direct cost to contractor but also required substantial follow-up.	Highest initial direct cost but required least follow-up.
2. Time required for data collection upon: a) LEA's b) Contractor	(LEA's refused participation)	a) Most. LEA personnel travel to central location plus collect all data. b) Least initial time -- but substantial follow-up and entire process "drags" out.	a) More than site visitation strategy. b) More than training strategy and also substantial follow-up and entire process "drags" out.	a) Least. b) Most initial time but greatly reduced follow-up and overall time required for process is controlled.
3. Forms and procedures development		Forms and procedures tested appear workable.	Forms and procedures tested appear workable.	Forms and procedures tested appear workable.
4. Burden upon local agencies	UNABLE TO BE TESTED	Substantial -- Estimated to average 4-8 person days for a 2,000 to 10,000 student institution plus one or two person days for training.	Substantial -- Estimated to average 3-6 person days including orientation for a 2,000 to 10,000 student LEA.	Least -- Estimated to average 2-4 person days including orientation for a 2,000 to 10,000 student LEA.
5. Reliability/ validity of data		Substantially more problems, but to some extent may have resulted from unique LEA situations.	Quality of data were better than training model but still required substantial follow-up to verify accuracy.	Appeared to produce best results but not possible to "objectively" verify.
6. Response rate		Two of three completed process within a "reasonable" time period.	All completed process but 3 of 4 LEA's took a substantial time period.	Very good -- Controlled.

pilot sites. It should be noted that generalizations from a sample of nine are at best tentative. However, in some areas it appears very clear as to some of the advantages/disadvantages of the three data collection strategies.

In general, there appears to be little difference between the off site training of LEA personnel and the on site facilitator strategies. Some of the minor differences may be more a function of the unique characteristics of the LEA's and the small sample size rather than from the result of the strategies. One of the most serious limitations of either the off site training of LEA personnel or the on site facilitator model (and conversely an advantage of the trained data collector model) was the inability to hold the LEA to a firm completion date for data collection. In both of these situations the schedule for completion was controlled by the LEA and once the orientation period was completed the collection of data often became low priority.

The trained data collector model appeared to show several advantages although the initial direct cost to the contractor was high. First, this method required significantly less LEA personnel time. Second, and along these same lines, the time it did require was not totally dedicated time. For example, under the off site training of LEA personnel model the person(s) was completely removed from the institution for one to two days and could not accomplish any of his or her routine tasks. When a trained data collector was on-site, the LEA person could "phase

in and out" of the data collection process as needed. Third, and possibly the most important consideration of all related to the ability of the trained data collector to make decisions with LEA personnel about any unique situations which might arise. Even with the on site facilitator model it was impossible to identify, much less resolve, all unique problems during the one day site visit. Fourth, but possibly a less tangible advantage of the trained data collector model was the ability of this person to coordinate the data collection efforts of several sources within the LEA. This is especially true in the comprehensive high school institution where data were obtained from the vocational director, the special education director and the business manager. Under the off site training of LEA personnel and the on site facilitator models, the data from each of these sources did not "check out" and it appeared that each person had supplied data in a slightly different form. Where the trained data collector model was used, these differences could be identified and resolved during the time of collection. Additional results related to the burden rate upon LEA's for data collection are found in Chapter VI.

3.3 SELECTION OF PILOT SITES

The RFP issued in connection with this project defined the type of institutions which could be included in the sample. Those definitions are presented below:

1) "The term 'area vocational education school' means (1) a specialized high school used exclusively or principally for the provision of vocational education to persons who are available for study in

preparation for entering the labor market, or (2) the department of a high school exclusively or principally used for providing vocational education in no less than five different occupational fields to persons who are available for study in preparation for entering the labor market, or (3) a technical or vocational school used exclusively or principally for the provision of vocational education to persons who have completed or left high school and who are available for study in preparation for entering the labor market, or (4) the department or division of a junior college or community college or university operating under the policies of the State Board and which provides vocational education in no less than five different occupational fields, leading to immediate employment but not necessarily leading to baccalaureate degree, if it is available to all residents of the State or an area of the State designated and approved by the State Board, and if, in the case of a school, department, or division described in (3) or (4), if it admits as regular students both persons who have completed high school and persons who have left high school."

2) "The term 'local education agency' means a board of education or other legally constituted local school authority having administrative control and direction of public elementary or secondary school in a city, county, township, school district, or political subdivision in a State, or any other public educational institution or agency having administrative control and direction of a vocational education program."

3) "The term 'postsecondary educational institution' means a nonprofit institution legally authorized to provide postsecondary education within a State for persons sixteen years of age or older who have graduated from or left elementary or secondary school."

4) "The term 'State' includes, in addition to the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands."

Although the RFP specified nine (9) pilot sites, the original EMS proposal suggested a "back-up" sample in addition

to the nine primary sites. However, in discussion with the Project Officer it was decided to drop the "back-up" sample because this could be interpreted to mean an 18-site sample and would then require formal clearance procedures. Thus, only nine active pilot sites were selected and if a site "dropped out" it was simply replaced with a new one.

This methodology for site selection used by IEF was studied as a reference. While some of those criteria were useful to this study, it appeared to be more important that the pilot sites selected be heterogeneous rather than proportionally representative of the universe. This appeared important because one of the major intents of this study was to test the forms and procedures under as many diverse situations as possible.

Given the definitions in the RFP and the need to maintain heterogeneity, the following criteria were developed for pilot site selection:

1) The nine sites selected shall be representative of and include at least three secondary schools, two postsecondary technical or vocational schools, one junior or community college, and one four-year institution.

2) The sites selected shall be public institutions.

3) The sites shall be selected from a minimum of five geographically representative states including the District of Columbia, with each of the four census regions represented. In addition, at least one of the nine sites shall be selected from the Commonwealth of Puerto Rico, or the Virgin Islands, or Guam, or American Samoa, or the Trust Territory of the Pacific Islands.

4) Each site shall provide vocational programs in at least five different occupational fields.

5) As a minimum, there shall be at least one site each that uses: Average Daily Attendance (ADA), Average Daily Membership (ADM), or Full-Time Equivalent (FTE) pupil accounting methods.

6) The sites shall be representative of the range of enrollments expected to be found in the sample universe with at least two sites being classified each as institutions having a small vocational enrollment, medium and large enrollment. (The approximate median size in the universe was 600 students. Further, it was decided not to select a very large LEA, such as the Chicago or New York school system.)

7) At least four of the nine sites shall have special education and/or compensatory education requiring the use of the modification to the IEF model.

8) The sites shall be representative of demographic conditions with at least one site drawing a majority of its clientele from each of the proposed "urbanisity" categories.

9) The sites shall be selected such that no more than five utilize the standard accounting practice as defined by Handbook II (Revised) and no more than seven which utilize program reporting procedures as defined in Handbook VI or HEGIS.

Given the suggested site selection criteria above, and the data collection strategies, EMS recommended nine sites be selected from the following pool of states:

Alabama	New Mexico
California	North Dakota
Colorado	South Carolina
Indiana	Texas
Maine	Utah
Michigan	Washington
Minnesota	American Samoa
Missouri	Puerto Rico

In discussion with the Project Officer, the state of California was excluded along with Puerto Rico and American Samoa. The state of Illinois was added and later Idaho was also added due to a cancellation by an LEA and the need to find a readily available replacement.

The sites selected by these criteria produced an unidentified but critical dimension to the study methodology. Neither the original IEF sample nor the sample criteria listed above identified this dimension. The dimension identified related to the fact that many (four of nine in the pilot sample) institutions did not offer a comprehensive education program and, hence, no basic program was available for a reference point from which to derive the differential cost. This dimension proved troublesome and is discussed in detail in Section 3.5.5.

The nine pilot sites which were finally selected are listed below:

Secondary Schools:

a) Granite School District
Salt Lake City, Utah

b) Lake Area Vocational Technical Center
Devils Lake, North Dakota

c) Northside School District
San Antonio, Texas

d) Suburban Hennepin County Area Vocational Technical Institute
Minneapolis, Minnesota

(Note - this district offers both secondary and postsecondary programs and is listed twice.)

Postsecondary Technical Institutes:

a) Suburban Hennepin County Area Vocational Technical Institute
Minneapolis, Minnesota
(see note (d) above)

b) Indiana Vocational Technical Institute
Indianapolis, Indiana

c) Trident Technical College
Charleston, South Carolina

Community Colleges:

a) Odessa College
Odessa, Texas

b) Vincennes University
Vincennes, Indiana

Four-Year College:

a) Lewis and Clark College
Lewiston, Idaho

3.4 ORIENTATION OF LEA PERSONNEL

The three data collection strategies actually used in the pilot test phase all incorporated an orientation component. Basically, the intent of the orientation component was the same, but the mode of presentation varied. Orientation materials were designed to provide LEA staff with a conceptual understanding of the project as well as specific details regarding data collection. Certain aspects of a hypothetical LEA were considered as a model problem and are presented in more detail in Chapter V.

The orientation sessions, which were conducted on site, were open to as many LEA people as wished to attend. The LEA's were encouraged to invite the vocational director, special education director, business manager, and a clerical person from each of these areas if appropriate. In some instances a higher ranking official, an assistant superintendent or dean, also attended the meeting. The session also provided an opportunity

to discuss potential problems and often these could be resolved with the personnel present. For the on-site facilitator data collection strategy, the orientation session usually occupied about one-half day whereas under the trained data collector model the orientation was usually shorter, lasting only about two hours. The off site training of LEA personnel orientation session involved a full day with the morning session devoted to the formal presentation and the afternoon session related to the discussion of general problems.

While there was no formal evaluation of the orientation sessions, the informal feedback suggested that the intent of the session filled a substantial need of LEA personnel. Further, based upon the difficulty of completing the data collection effort at the local level, it is difficult to see how this type of study could be accomplished without some formal orientation of LEA personnel.

3.5 DATA COLLECTION PROBLEMS

The data collection procedures of the model were tested at the nine pilot sites. While the sites could be considered generally representative of the type of LEA's to be included in a national survey, the nine sites were not necessarily representative of all types of LEA's and the problems discussed in this section are limited to the experience gained at these nine sites. While none of the data collection problems discussed below, in EMS's opinion, invalidate the differential cost model, they do raise substantive questions about the

methods of data collection.

3.5.1 Definition of Vocational Programs and Subprograms

As discussed in the previous chapters, data were collected according to the subprogram definition given by Handbook VI. Experience at the nine sites indicates that this plan is a workable one and that accurate data can be obtained using the model's guidelines. However, such procedure usually involves greater efforts as well as more subjective decisions by the personnel gathering data than if the aggregation were made at the program level. An example would be a LEA with only one vocational program area and only two subprograms within that area. As a specific example, suppose the LEA offered Blueprint Reading (17.05) and Construction and Maintenance Trades (17.10) (while this is not a realistic example of what was found within the sites, it does serve to illustrate the point). Further, suppose there is one single supply expenditure of $15,000 in the LEA for all vocational programs. (Many instances were observed in the LEA's where subprogram supply expenditures were aggregated under a program area or even under the total vocational division.) If the differential cost model were strictly applied to this situation, two options would be available. First, and clearly the most accurate, would be to examine all supply purchases to determine assignment to the appropriate subprogram. This could be both time consuming and difficult depending upon the accounting practices of the LEA. Second, assuming the first option could not be done, the model

would suggest prorating "undeterminable" cost on the basis of FTE students. This latter procedure could be grossly inaccurate under certain situations. A third possiblity, but not one specifically suggested by the model, is to subjectively prorate the expenditures to the subprograms. Using the above example, it could be assumed under most situations, that the supply expenditures for Construction and Maintenance Trades (17.10) would be substantially higher per FTE student than for Blueprint Reading (17.05) and given the difficulty of determining exactly the origin of each expenditure, it may be best to use a subjective judgement as opposed to a FTE student proration method. However, the main point of this discussion is to note that if the cost information were aggregated at the program level, there would be no need to break down the $15,000 supply expenditure in the first place.

A second problem due to the subprogram classifications is assignment of a LEA activity to a given Handbook VI code. LEA's, especially community and four year colleges, do not appear to use the Handbook VI classification structure. Further, and especially in smaller secondary schools, a given activity may contain students who are actually in different subprograms but are placed in a common class because of low enrollments. In these type of situations, it is not always possible to directly assign a Handbook VI code to the cost center. Again, if the data were aggregated at the program level rather than at the subprogram level, many of these

problems could be avoided.

3.5.2 Definition of Student and Staff FTE's

The conceptual framework for counting FTE's as defined by the model appears to be appropriate. However, the specific procedures used must be flexible to the particular circumstances of a given LEA. It is especially critical that the definition used to calculate FTE's at the sub-program level be consistent with the definition used to calculate FTE's at the agencywide level. The IEF final report, page 177 indicated for secondary schools, "The most desirable method of student accounting is the full-time-equivalent (FTE)...based upon...(student contact hours ÷ 900)". While this definition is appropriate if consistently applied, it could, and did lead to some confusion because LEA's have different definitions of a FTE. For example, a Texas pilot site defined a FTE as receiving 875 contact hours of instruction whereas a Minnesota site defined a FTE as receiving 1050 contact hours. Experience with the pilot sites suggest that it would be more efficient, and less confusing if a FTE were based upon the locally accepted definition rather than upon a uniform standard. Further, since the purpose of the model is to determine the differential cost of vocational education as compared to basic education rather than a cost per clock hour, it would not appear that this procedure would violate the intent of the model.

Another somewhat troublesome data collection problem was the determination of FTE staff. Some LEA's do not distinguish between part and full-time personnel in counting staff. While this proration can usually be made in the vocational area, because of smaller numbers of staff, it becomes more difficult at an agencywide level. There does not appear to be a simple solution to this problem as it is not concerned with the definition of a FTE staff, but rather the problem arises out of the staff accounting system. Basically, the staff accounting system does not provide sufficient data to accurately determine the FTE count and since it is a LEA "problem" it appears that little can be done to expedite data collection under such circumstances.

3.5.3 Determination of Certain Direct Costs

The problems related to this discussion are not unlike those discussed in Section 3.5.1 above. Since the intent of the model is to determine differential costs and since the model is "driven" substantially by student numbers and direct costs, then the extent to which costs can be classified as either direct or indirect greatly influence the cost differential. As an example, it could be generally agreed that a welding program uses a greater proportion of electrical energy than most other vocational programs and especially basic programs. While this, in fact, is "known" the inability of the LEA to determine this direct

cost (short of installing a separate electrical meter) is very difficult. What usually happens to many of these costs is that they are simply prorated across all students according to the indirect cost methodology provided by the model and in effect these "direct" costs actually become "indirect" costs. The net effect is to produce a cost leveling effect between high cost vocational programs and lower cost non-vocational programs.

There is probably no ready solution to this problem especially in a large-scale survey effort as the problem is not one of theory but rather of data collection operations. However, model results should be interpreted within these contraints.

3.5.4 Allocation/Inclusion of Certain Indirect and Related Costs

A question arose at two of the sites regarding the need (and appropriateness) of including some portion of state agency costs in calculating cost at the institution level. For example, at a community college which served as a basic cost reference institution, the State Community College Board provides direct service to the institution such as computer support for accounting, payroll, and personnel support. In this case the dollar amount of such services provided to the eighteen colleges in the system was known, and a portion of these costs were assigned to the sample institution based on institution FTE's in relation to the total throughout the system.

A second example was at one of the eight institutions which form a statewide postsecondary vocational system. Much of the accounting function is centralized in the state office for these institutions and data were collected through the state office. Because of the direct nature of service provided to these institutions by the state office, an appropriate portion of administrative and support service costs were prorated to the sample institution based on institution FTE's.

These examples raise the general questions of the appropriateness of recognizing certain state agency costs in determining cost at the institutional level. Certainly any education agency from which data might be collected will have some related state agency which administrates or supports LEA operations. Because of the direct nature of services provided in the above examples (and the identifiability of costs for these services), it seemed appropriate to assign an appropriate portion of these costs to the LEA.

It is not clear, however, what costs, if any, should be included when the nature of state agency support/service is less direct. As an extreme example, take the case of a secondary school district in a state system of 500 such districts. What cost, if any, should be recognized at the district level for expenditures relating to operation of the state education agency?

This study raises, rather than resolves, this question.

It seems clear that when direct service is involved, an appropriate cost should be recognized. When service is less direct, the question becomes an extremely cloudy issue.

The national sample will undoubtedly include instances which cover the entire spectrum ranging from clearly identifiable direct service to totally indirect service. In the latter instance, and for those cases falling somewhere in the middle of the spectrum, criteria will need to be developed that define what cost(s) will be recognized at the LEA level.

3.5.5 Determination of an Appropriate Basic Cost Reference

The differential cost methodology assumes a reference point from which vocational differential costs are calculated. This reference point is termed "basic education" and is defined as the cost of education with certain special programs, e.g., vocational, special, and compensatory education, removed. No major problems exist in identifying basic costs for the LEA which offers a comprehensive educational program. The methodology of the model adequately provides guidelines for these cost calculations. However, the methodology is absent on procedures to be used when a LEA does not offer a comprehensive educational program and thus does not have a reference for the cost of basic education.

There are at least two situations where LEA's do not offer a comprehensive educational program. One is at the secondary level where an area vocational center serves a

number of LEA's within a geographical region but offers only vocational programs. The second is at the postsecondary level where "technical institutions" offer only vocational courses. In some instances, these institutions are part of a statewide system and may serve students from a wide geographical area. In each situation the problem is the same. What is an appropriate reference base from which to derive the cost of basic education?

In attempting to answer the above question, concerns about efficiency of data collection must be balanced against accuracy considerations. For example, if a secondary vocational center served ten (10) LEA's would it be appropriate to collect data from all ten (10) to establish the base, from just a sample, from the LEA's with the largest enrollment, or should data from the LEA's with larger enrollments be "weighted more", etc? As one can see, the list of questions could become long very quickly. Thus, some uniform criteria must be established to guide data collection efforts in these situations. However, while such criteria are clearly needed, it is necessary that these criteria be flexible enough to accommodate unique situations as well as "common sense" judgements of the data collection personnel.

In discussions with the Project Officer, EMS agreed to suggest criteria for the selection of the "basic" institution. These proposed criteria are as follows and are not in any order of priority.

1) Public Institution - The basic institution should be tax supported as opposed to private. The vocational LEA's are public institutions and it follows that the basic institutions should also be public.

2) Clientele Served - The basic institution should serve students from the same general location as the vocational institution and the students should be of similar social economic status.

3) Comprehensiveness of Program - It is important that the basic institution offer a wide range of non-occupational programs (in fact, the institution could also offer occupational programs and not be part of the sample). If broader offerings of programs are provided, the more likely the institution will: 1) Attract a larger cross section of the potential student population, and 2) Reduce the overall influence of any unique high or low cost programs.

4) Level of Offerings - It would appear obvious that the basic institution must operate programs at the same level (secondary or postsecondary) as the vocational LEA.

5) Enrollment of Students - While it might appear appropriate to match institutions on enrollment size, a better criterion may be to select an "average size" basic institution. There are reasons for this. Numerous financial studies have shown that the very small and the very large (relatively speaking) institutions operate at higher student costs than the average-size institution. Inefficiencies of operation appear at both ends of the size continuum. Further, if vocational LEA's were matched to basic LEA's on size alone, quite often they would be matched to smaller institutions. The best example of this situation is in the case of secondary vocational cooperative centers. Typically the center serves a group of LEA's (of varying size) and offers low incidence programs which would not be available in most LEA's. For this reason, the total number of students enrolled in this type of vocational institution would be small relative to any of the LEA's and a match made on size alone would thus match the vocational center with the smallest district where costs are often relatively high. Thus the resulting differential cost could be misleading. Therefore, size matching should be made to an "average" size LEA rather than to one matched strictly on comparable enrollment size.

6) Nearness of Location - Proximity of location in itself will not necessarily assure comparable institutions. However, nearness will probably serve to control some of the other factors such as type of students served but not necessarily so. Therefore, nearness may be an asset in selecting a basic institution but other criteria factors must also be considered.

7) Employee Salary Schedules, Staffing Levels, and Seniority of Staff - Since staff costs are the major expenditure in any educational institution it would appear logical that salary levels should be comparable. However, even if salary schedules are relatively alike costs could still vary substantially due to staffing level (student/teacher ratio) and/or seniority of staff (placement of individuals upon the salary schedule). While it probably is not possible to determine the exact match in these areas, nevertheless, local administration should be consulted for their observation and recommendations. Again, it appears that an "average" institution would be the best choice.

8) Accounting System - Since the time involved in determining basic education costs is often related to the type of accounting system employed by the LEA, some consideration should be given to choosing a LEA which utilizes program accounting and which breaks out costs by level.

An effort to solve the data collection problem associated with the choice of a basic institution, in the opinion of the study team, should receive high priority. The amount of error introduced into situations where a "separate" LEA is selected for a reference is unknown. Also, it is unknown what errors could be introduced by initially selecting LEA's by virtue of having both vocational and basic programs contained within the same organizational structure. Clearly, such a selection criteria could exclude whole postsecondary systems of vocational-technical education such as the Area Vocational Technical Institute system in Minnesota and would probably defeat the intent of the model.

3.6 VOCATIONAL COST RESULTS - PILOT SITES

This section of the study provides a summary of the program, student, and fiscal data obtained at each site. These data for vocational education are provided at both the program and subprogram areas. A cost index is also calculated at the vocational program and subprogram level based on the cost of basic education at sites where it was possible to retrieve basic cost data. As discussed in Chapter III, four of the nine institutions in the pilot sample did not offer a comprehensive education program. For these institutions an external basic cost reference institution was used.

Although program costs were determined as a result of the study activities and provide an analysis of the relative costs of programs within the institutions studied, it should be remembered that the major purpose of this study was the testing of methodology related to implementing the model rather than the findings relating to actual costs. Thus, one is cautioned against drawing conclusions relative to vocational education costs from the findings presented herein.

Data were often provided for each course. These data were aggregated to the subprogram level within each program area. Data for all subprograms were then aggregated to the program area as shown in the tables which accompany the brief site descriptions found in the next nine sections.

3.6.1 Site A

Site A, located in the West, has 59,000 students and 2,900 certified employees. It is the largest public school district in the state with 54 elementary schools, 13 junior high schools, and 7 senior high schools. The district offers

Table 3.3

DIFFERENTIAL COST RESULTS FROM SITE A

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	27,977.0	29,851,459	1,067	1.00
AGRICULTURE 01	18.14	47,510	2,619	2.45
Ag. Prod. 01.01	8.14	29,274	3,596	3.37
Orn. Hort. 01.05	10.0	18,236	1,824	1.71
HEALTH OCCUP. 07	38.57	139,947	3,628	3.40
HOME ECONOMICS 09	112.28	269,891	2,404	2.25
OFFICE OCCUP. 14	223.51	676,552	3,027	2.84
Filing 14.03	106.94	251,075	2,348	2.20
Sup./Adm. Mgt. 14.08	116.57	425,477	3,650	3.42
TRADES/IND. OCCUP. 17	542.78	1,637,706	3,017	2.83
Automotive 17.03	91.96	252,573	2,747	2.57
Comm. Art 17.07	9.42	23,183	2,461	2.31
Photography 17.09	13.28	39,621	2,984	2.80
Construction 17.10	127.70	576,327	4,513	4.23
Drafting 17.13	21.71	66,115	3,045	2.85
Electronics 17.15	23.14	71,160	3,075	2.88
Graphic Arts 17.19	11.0	84,000	7,636	7.16
Metalworking 17.23	51.56	145,284	2,818	2.64
Upholstering 17.35	6.57	11,650	1,773	1.66
Woodworking 17.36	7.71	21,372	2,772	2.60
Other 17.99	178.73	346,421	1,938	1.81
TOTAL	935.28	2,771,606	2,963	2.78

over 50 vocational programs.

3.6.1.1 Program Data

Each vocational course in the school district was identified by title and by a USOE six-digit code. Data for this report were derived from the annual report sent to the State Department of Education.

3.6.1.2 Student Accounting

Student accounting for basic students was based on average daily membership (ADM). Vocational enrollments came from an enrollment count taken the second week of school. A full-time-equivalent student was defined as one in attendance 7 periods per day for 36 weeks.

Students who receive Special Education in Resource Centers from 1 to 5 hours per day are counted twice for State reporting purposes -- once as a "basic" students and again as a partial FTE for Special Education reimbursement. These resource students were not counted for purposes of deduction in this report according to the replacement criteria. However, all expenditures associated with the education of the handicapped were deducted according to the model.

3.6.1.3 Fiscal Accounting

This district does not use the financial accounting system in Handbook II. District administrative costs are not broken down by grade level, thus necessitating a proration of costs. In this district, the internal budgeting system assumed that 47% of the district administrative expenditures occurred at the secondary level.

School costs (excluding administration) were derived by going through the budget categories for each secondary school and totaling these figures.

Vocational program costs were obtained from State audit reports. Special Education costs were derived from the year-end audit report.

3.6.2 Site B

Site B is a multi-district vocational-technical center serving a four county area in the North Central United States. The center employs 17 teachers for instructing approximately 535 students. The high school which serves as the fiscal agent for the center was used for the basic cost comparison. The high school is located in the same town as the Vocational-Technical Center and has 40 teachers and approximately 900 students.

3.6.2.1 Program Data

Vocational courses were listed by the USOE six-digit code. There was some difficulty determining the placement of Consumer Homemaking which is offered in the high school and is coded (09.01). The feeling of the administration was that this course is for the occupation of homemaker and not directed toward an occupation outside the home. Thus, it was decided not to consider this a vocational offering comparable to those offered at the Vocational Center.

3.6.2.2 Student Accounting

The vocational student FTE's were derived by taking the fall enrollment count in each 2 hour block and

Table 3.4

DIFFERENTIAL COST RESULTS FROM SITE B

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	837.14	1,233,668	1,473	1.00
AGRICULTURE 01	27.8	39,544	1,422	.96
HEALTH 07	10.4	23,532	2,263	1.54
HOME EC. 09	20.0	48,668	2,433	1.65
OFFICE 14	41.8	101,350	2,425	1.65
Filing 14.03	20.0	52,447	2,622	1.78
Sup./Adm. Mgt. 14.08	21.8	48,903	2,243	1.52
TRADES/IND. 17	70.8	156,192	2,206	1.50
Automotive 17.03	21.6	51,526	2,385	1.62
Construction 17.10	14.4	24,144	1,677	1.14
Drafting 17.13	5.6	8,872	1,584	1.07
Printing 17.19	7.2	17,582	2,442	1.66
Metalworking 17.23	12.0	28,965	2,414	1.64
Small Eng. 17.31	10.0	25,103	2,510	1.70
TOTAL	170.8	369,286	2,162	1.47

multiplying by .4 (2/5's of 5 hour day).

Vocational FTE's = enrollment x .4

Basic FTE's were derived from the fall and winter enrollments. Vocational education students attending the Vocational Center were subtracted out at .4 FTE per student. Special Education full-time students were also deducted from the basic student count.

3.6.2.3 Fiscal Accounting

Costs for the vocational programs were provided by the Assistant Superintendent who is also the Vocational Center Director.

The same indirect costs used to calculate the basic cost per FTE were used to calculate the vocational FTE student cost since it is assumed that the vocational students do receive similar services from their home district.

3.6.3 Site C

Site C is a small four-year postsecondary institution located in the Northwest. The college has a basic academic division and a vocational technical division. The Vocational Technical Division is divided into two major areas: Trades and Technology and Vocational Business.

3.6.3.1 Program Data

Each vocational course could be identified by both the HEGIS code and the USOE six-digit code. Data for this study were gathered on site utilizing computer print-outs of the year-end audit reports.

Table 3.5

DIFFERENTIAL COST RESULTS FROM SITE C

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	882.0	2,859,444	3,242	1.00
DIST. ED. 04	16.1	93,647	5,817	1.79
Automotive 04.03	6.2	40,065	6,462	1.99
Gen. Mech. 04.08	9.9	53,582	5,412	1.67
HEALTH OCCUP. 07	19.0	48,628	2,559	.79
OFFICE OCCUP. 14	109.5	316,455	2,890	.89
TRADES/IND. 17	180.7	838,945	4,643	1.43
Automotive 17.03	36.6	205,081	5,603	1.73
Construction 17.30	31.4	137,223	4,370	1.35
Drafting 17.13	18.8	61,477	3,270	1.01
Cons. Elect. 17.15	35.0	188,595	5,388	1.66
Graphic Arts 17.19	21.7	74,612	3,438	1.06
Metalworking 17.23	18.8	53,953	2,870	.89
Public Serv. 17.28	11.7	78,501	6,709	2.07
Small Eng. 17.31	6.7	39,503	5,896	1.82
TOTAL	325.3	1,297,675	3,989	1.23

3.6.3.2 Student Accounting

Basic academic students FTE enrollment is based on 15 contact hours for 16 weeks per semester plus one 8 week summer session.

$$\text{Academic FTE's} = \frac{\text{enrollment} \times 15 \times 40}{600}$$

Vocational FTE's were based on a 6 hour day, 5 times per week for 32 weeks:

$$\text{Vocational FTE's} = \frac{\text{enrollment} \times 6 \times 5 \times 32}{960}$$

Program accounting and the maintenance of total student credit and contact hours made the data collection relatively easy.

3.6.3.3 Fiscal Accounting

Since the academic and vocational divisions are budgeted separately, most indirect costs had already been allocated to the appropriate division. In some cases no indirect costs are allocated to the vocational division, i.e., libraries, museums, audio visual, since these facilities are not utilized by that division. Thus, in the final calculation of costs per FTE, only the indirect costs associated with the academic division were used to calculate the basic FTE, while the indirect costs allocated to the Vocational Technical Division were used to determine the vocational FTE program costs.

3.6.4 Site D

Site D is a two year community college located in the Southwest. The college, situated in the center of a mid-sized

Table 3.6

DIFFERENTIAL COST RESULTS FROM SITE D

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	1,753	3,099,981	1,768.39	1.00
DIST. ED. 04	81.8	50,239	614	.35
HEALTH 07	488.9	654,343	1,338	.76
Med. Lab. 07.02	35.6	61,373	1,724	.97
Nursing 07.03	348.4	386,245	1,109	.63
Radiologic 07.05	42.3	65,208	1,542	.87
Misc. 07.09	62.6	141,517	2,261	1.28
HOME EC. 09	37.4	135,115	3,613	2.04
OFFICE OCC. 14	397.2	675,887	1,702	.96
Bus. Data 14.02	39.9	182,039	4,562	2.58
Steno 14.07	190.7	279,334	1,465	.83
Mid-Mgt. 14.08	166.6	214,514	1,288	.73
TECHNICAL 16	162.3	298,430	1,839	1.04
Elec. 16.01	88.0	130,516	1,483	.84
Misc. 16.06	74.3	167,914	2,260	1.28
TRADES/IND. 17	618.6	1,206,090	1,950	1.10
Air Cond. 17.01	51.0	101,724	1,995	1.13
Automotive 17.03	75.4	113,044	1,499	.85

Table 3.6 (cont'd)

DIFFERENTIAL COST RESULTS FROM SITE D

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
Photography 17.09	32.0	71,352	2,230	1.26
Construction 17.10	20.7	48,471	2,342	1.32
Diesel 17.12	46.0	79,555	1,729	.98
Drafting 17.13	29.0	57,156	1,971	1.11
Radio/TV 17.15	24.9	88,628	3,559	2.01
Metalworking 17.23	197.7	473,605	2,396	1.35
Pers. Service 17.26	101.6	106,961	1,053	.60
Public Service 17.28	40.3	65,594	1,628	.92
TOTAL	1,786	3,020,104	1,691	.96

city, (pop. 100,000) offers both university-parallel courses and occupational-technical programs. The college has more than 16,000 students enrolled during a single year, but many of these are part-time. Approximately one-half of the college's students are enrolled in vocational-technical programs.

3.6.4.1 Program Data

Each vocational course was identified by both the HEGIS code and the USOE six-digit code. Data for this study were derived from the Public Junior College Cost Survey for the twelve months ending August 31, 1978.

3.6.4.2 Student Accounting

Basic Academic student enrollment and Vocational-Technical student enrollment are based on a contact hour formula. Student FTE's for the two semesters are calculated using a 12 hour week and 32 weeks. FTE's for the summer sessions total 96 contact hours. Thus, for one school year, one FTE equals 480 hours.

$$\text{FTE's} = \frac{\text{enrollment} \times 12 \times 32 + 96}{480}$$

3.6.4.3 Fiscal Accounting

Costs for the academic and vocational program costs were all derived from the Public Junior College Cost Survey.

3.6.5 Site E

Site E is a large public school district located in the Southwest. The district has four high schools, seven middle schools, twenty-two elementary schools, and three special purpose schools. District enrollment during 1977 was 31,200.

Table 3.7

DIFFERENTIAL COST RESULTS FROM SITE E

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC*	28,258	31,656,024	1,120.25	1.00
AGRICULTURE 01	56.35	105,370	1,870	1.67
DIST. ED. 04	39.42	118,290	3,000	2.68
HEALTH 07	35.18	72,979	2,074	1.85
HOME ECONOMICS 09	397.90	567,965	1,427	1.27
Homemaking 09.01	245.36	275,544	1,123	1.00
Occup. Prep. 09.02	113.23	202,944	1,792	1.60
Other Home Ec. 09.99	39.31	89,477	2,276	2.03
OFFICE OCCUP. 14	59.53	117,123	1,967	1.76
TRADES/IND. OCCUP. 17	547.94	758,649	1,385	1.24
Ref/A.C. 17.01	14.81	19,483	1,316	1.17
Automotive 17.03	83.01	116,051	1,398	1.25
Construction 17.10	74.55	123,148	1,652	1.47
Radio/TV 17.13	30.38	37,338	1,229	1.10
Electrical 17.14	33.16	47,127	1,421	1.27
Electronics 17.15	31.00	40,330	1,301	1.16
Printing 17.19	15.12	18,860	1,247	1.11
Metalworking 17.23	31.46	45,371	1,442	1.29
Other 17.99	234.45	310,941	1,326	1.18
OTHER 99	69.97	69,841	998	.89
TOTAL	1,206.29	1,810,217	1,500	1.34

*K-12

The district employs over 100 vocational education instructors and provides vocational education opportunities in six program areas. The basic cost reference in this district was calculated for the K-12 program since data were not provided with the levels differentiated.

3.6.5.1 Program Data

Most vocational courses were identified by a USOE six-digit number. Several combination and cooperative education courses, however, were not identified at the subprogram level but had been classified at the course level, i.e., Agriculture - Combined Production and Farm Production - 01.0008. For this study, this course was aggregated to the other Agriculture subprogram level 01.99. Similar combination and cooperative education courses were found in the Health, Home Economics and Trades and Industry areas. It was noted that Handbook VI does not provide a category for Home Economics "Other" courses, but for this program analysis the digits 09.99 were used for placing Home Economics courses which did not have a subprogram designator.

The district also offers a course called Occupational Investigation which does fit readily into any Handbook VI category. Since the district gave this course a designator, 99.0120, that designator was employed in this study.

3.6.5.2 Student Accounting

Student accounting was based on average daily attendance (ADA). Basic student FTE's were derived by

dividing the ADA's by the average annual attendance percentage of 93.4%. Thus, the 1977-78 ADA of 28,199.84 resulted in a total FTE enrollment of 30,193. The vocational education student FTE's were calculated according to contact hours with one FTE being equal to 5 contact hours per day for 35 weeks.

$$\text{Vocational FTE's} = \frac{\text{enrollment} \times 25 \times 35}{875}$$

Special Education FTE's for students in self-contained classrooms were deducted from the basic student FTE count using a figure supplied by the Assistant Superintendent in charge of Pupil Services.

3.6.5.3 Fiscal Accounting

The district employs program accounting and thus vocational education costs were readily accessible. Basic education cost data were taken from a trial balance sheet supplied by the Business Manager. These figures were for the entire K-12 budget as were the attendance figures which had been used to calculate the basic education costs. It should be noted that the differential cost of vocational education might vary to some degree if the basic cost reference had excluded the K-6 program.

3.6.6 Site F

Site F is a special service district in the Midwest providing both secondary and postsecondary vocational programs (as well as special education services). At the secondary level, thirteen member districts participate. Approximately 500 student FTE's are served by 52 FTE staff in 25 programs.

At the postsecondary level, students are drawn from the general geographic area. Approximately 3400 FTE students are served by 250 FTE staff in 60 programs. Two campus locations serve both secondary and postsecondary programs.

No basic programs are offered at either the secondary or postsecondary levels. For purposes of comparison, one of the participating districts was selected at the secondary level, and a community college serving the same general geographic area was selected for the postsecondary comparison.

The secondary district selected for comparison is roughly in the middle of the range for participating schools in terms of district size (i.e., enrollment) and expenditure (per pupil). Thus, distortions which might occur through use of a district at either extreme were avoided, and the comparison district may, in this sense, be considered "typical." Total enrollment in this district is approximately 9700 with approximately 500 FTE teachers.

The community college selected for the postsecondary basic comparison enrolls approximately 2400 students and is served by approximately 100 FTE teachers.

Specific characteristics of the vocational site as well as the two basic comparison sites are discussed below.

3.6.6.1 Program Data

Vocational courses at the vocational site are identified by program name and by the six-digit USOE program code. The program oriented accounting system uses a unique set of account numbers which can be referenced to the OE program codes. Data were derived from the

year-end final figures from district records.

Program-specific data were not collected at the basic reference sites.

3.6.6.2 Student Accounting

Secondary students at the vocational site are served in programs for two hours out of a standard six-hour day. Thus, each student enrolled in a vocational course for the full (175-day) year represents .33 (2 hours ÷ 6 hours) FTE.

The postsecondary vocational programs are operated on a year-round open enrollment system. A full-time-equivalent student is one enrolled for the full six-hour day, five days per week, for the full year.

Student enrollments at the secondary basic comparison district are based on the October 1 count submitted by the district to the state. Full-time equivalency is defined as a student in attendance 6 periods per day for the 175-day school year. Special education students deducted from the total are based on a count of full-time students served in self-contained settings.

Student FTE's at the postsecondary basic comparison institution were derived based on student attendance for a six-period day for the full year.

3.6.6.3 Fiscal Accounting

The financial accounting system of the vocational site is a relatively sophisticated program-oriented system. Virtually all financial records are computerized. Direct program costs were easily derived from the system.

The allocation of indirect costs was a time consuming manual process, however, due to the large number of programs and the two levels (secondary and postsecondary). All financial data were derived from the district's year-end financial reports.

Financial data for the secondary basic comparison district were derived from audited year-end district financial records. With the exception of special education costs, district records aggregate costs separately for secondary education, thus facilitating secondary cost determination. Special education costs were prorated between elementary and secondary based on student FTE's.

Computerized year-end financial records were utilized for cost determination at the postsecondary basic comparison institution. In addition, data supplied by the State Community College Board were used to determine the cost of direct support services provided to the institution by Board staff. These data were derived from the HEGIS report submitted by the Board. Tables 3.8 and 3.9 present the cost differential results.

3.6.7 Site G

Site G is a postsecondary vocational institution located in the Midwest. It is one of eight postsecondary vocational institutions in the state system. This particular site is located in the same city on the same grounds as the state vocational offices. Most of the data were derived from state records which are maintained on a centralized basis for all

Table 3.8

DIFFERENTIAL COST RESULTS FROM SITE F (SECONDARY)

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	9,580.0	14,734,040	1,538	1.00
AGRICULTURE 01	55.61	170,048	3,058	1.99
Ag. Prod. 01.01	6.67	27,411	4,110	2.67
Orn. Hort. 01.05	48.94	142,637	2,915	1.90
DISTRIBUTIVE ED. 04	18.77	83,063	4,425	2.88
HEALTH OCCUP. 07	37.47	120,727	3,222	2.09
HOME ECONOMICS 09	38.53	114,492	2,972	1.93
OFFICE OCCUP. 14	32.24	99,751	3,094	2.01
Banking 14.01	9.27	32,187	3,472	2.26
Filing, etc. 14.03	22.97	67,564	2,941	1.91
TECHNICAL ED. 16	4.67	27,413	5,870	3.82
TRADE/IND. OCCUP. 17	331.53	1,033,573	3,118	2.03
Air. Cond. 17.01	18.43	67,790	3,678	2.39
Automotive 17.03	75.23	91,116	1,211	0.78
Comm. Art 17.07	25.47	87,462	3,434	2.23
Construction 17.10	71.33	293,409	4,113	2.67
Electronics 17.15	21.57	70,186	3,254	2.12
Graphic Arts 17.19	23.47	66,851	2,848	1.85
Metalworking 17.23	38.10	135,251	3,550	2.31
Plastics 17.27	7.30	34,346	4,705	3.06
Quan. Food 17.29	26.80	108,776	4,059	2.64
Small Eng. 17.31	23.83	78,386	3,289	2.14
TOTAL	518.82	1,649,067	3,178	2.07

Table 3.9

DIFFERENTIAL COST RESULTS FROM SITE F (POSTSECONDARY)

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	1,344	2,550,912	1,898	1.00
AGRICULTURE 01	186.5	702,489	3,767	1.98
Ag. Prod. 01.01	22.5	86,908	3,863	2.04
Ag. Supplies & Services 01.02	65.9	200,214	3,038	1.60
Ornamental Horticulture 01.05	98.1	415,367	4,234	2.23
DISTRIBUTIVE ED. 04	176.1	554,200	3,147	1.66
Floristry 04.05	33.0	151,805	4,600	2.42
Gen. Merchandise 04.08	143.1	402,395	2,812	1.48
HEALTH OCCUP. 07	224.4	848,446	3,781	1.99
Dental 07.01	103.2	360,902	3,497	1.84
Med. Lab. Tech. 07.02	26.3	137,590	5,232	2.76
Nursing 07.03	64.4	270,898	4,206	2.22
Misc. Health Occupations Ed. 07.09	30.5	79,056	2,592	1.37
HOME ECONOMICS 09	46.0	221,101	4,807	2.53
OFFICE OCCUP. 14	438.5	1,510,567	3,445	1.81
Accounting & Computing Occupations 14.01	120.5	336,657	2,794	1.47
Bus. Data Processing Systems Occupations 14.02	41.5	191,870	4,623	2.44
Filing, Office Machines, & General Office Clerical Occupations 14.03	276.5	982,040	3,552	1.87

Table 3.9 (cont'd)

DIFFERENTIAL COST RESULTS FROM SITE F (POSTSECONDARY)

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
TECHNICAL ED. 16	459.3	1,358,076	2,957	1.56
Engineering - Related Technology 16.01	268.8	744,552	2,770	1.46
Electronics 16.07	162.2	540,467	3,332	1.76
Other Tech.Ed. 16.10	28.3	73,057	2,582	1.36
TRADE/IND. OCCUP. 17	1,889.1	7,334,434	3,883	2.05
Air Conditioning 17.01	74.9	251,064	3,352	1.77
Auto Services 17.03	369.0	1,580,992	4,285	2.26
Commercial Art 17.07	108.5	383,170	3,532	1.86
Commercial Photography 17.09	77.5	280,506	3,619	1.91
Construction & Maintenance Trades 17.10	230.5	956,720	4,151	2.19
Diesel Mechanic 17.12	50.4	150,413	2,984	1.57
Drafting 17.13	177.9	521,150	2,929	1.54
Electronics 17.15	75.9	268,566	3,538	1.86
Graphic Arts 17.19	150.1	484,373	3,227	1.70
Metalworking 17.23	276.9	1,129,870	4,080	2.15
Plastics 17.27	25.5	116,838	4,582	2.41
Quantity Food 17.29	144.2	759,831	5,269	2.78
Small Engine Repair 17.31	24.5	97,061	3,962	2.09
Woodworking 17.36	103.3	353,880	3,426	1.80
TOTAL	3,419.9	12,529,313	3,664	1.93

Table 3.10

DIFFERENTIAL COST RESULTS FROM SITE G

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC*	1,534	2,405,143	1,568	1.00
AGRICULTURE 01	24	62,148	2,590	1.65
DISTRIBUTIVE ED. 04	273.9	365,586	1,335	0.85
Distributive Ed. 04.00	227.3	278,545	1,225	0.78
Hotel/Motel 04.11	46.6	87,041	1,868	1.19
HEALTH OCCUP. 07	304	490,127	1,612	1.03
Med. Lab. Tech. 07.02	54.2	106,237	1,960	1.25
Nursing 07.03	56.4	86,878	1,540	0.98
Diag. Ultra Sound 07.05	53.2	56,828	1,068	0.68
Misc. Health Occupations Ed. 07.09	140.2	240,184	1,713	1.09
OFFICE OCCUP. 14	809	1,369,188	1,692	1.08
Accounting & Computing Occupations 14.01	177	282,113	1,594	1.02
Bus. Data Processing Systems Occupations 14.02	253.3	475,459	1,877	1.20
Filing, Office Machines, & General Office Clerical Occupations 14.03	23.4	37,464	1,601	1.02
Banking/Credit 14.08	355.3	574,152	1,616	1.03
TECHNICAL ED. 16	283.5	409,521	1,445	0.92
Engineering - Related Technology 16.01	276.5	398,930	1,443	0.92
Educational Aide 16.06	4.3	6,423	1,601	1.02
Other Tech. Ed. 16.10	2.7	4,168	1,543	0.98

*Basic cost derived from Site H.

Table 3.10 (cont'd)

DIFFERENTIAL COST RESULTS FROM SITE G

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
TRADE/IND. OCC. 17	750.8	1,758,086	2,342	1.49
Air Conditioning 17.01	242.4	476,980	1,968	1.26
Auto Services 17.03	236.4	575,023	2,432	1.55
Commercial Art 17.07	3.7	5,874	1,588	1.01
Construction & Maintenance Trades 17.10	40.4	55,650	1,377	0.88
Drafting 17.13	45.1	119,956	2,593	1.65
Metalworking 17.23	182.8	524,603	2,870	1.83
TOTAL	2,445.2	4,454,656	1,822	1.16

institutions in the system.

This institution operates 27 vocational programs and serves a total enrollment of approximately 2400 students with a staff of 147 FTE teachers.

No basic cost reference was available in the immediate geographic area for this institution due to the absence of 2-year postsecondary institutions in this particular state. As a result, the basic cost reference for Site H, located in the same state, was used. See Section 3.5.5 for a more complete discussion of the problem of identifying an appropriate basic cost reference.

3.6.7.1 Program Data

Each vocational program at this site is coded using the four-digit HEGIS code. Program data were readily available in the state office records according to this format. This information was supplemented by data provided by the institution and discussions with various institution staff.

3.6.7.2 Student Accounting

Student full-time equivalency is defined in terms of credit hours. Fifteen student credit hours per quarter is considered to be full-time. The school operates three academic quarters per year. Therefore, a full-time-equivalent is defined as 45 student credit hours (15 credit hours per quarter x 3 quarters).

3.6.7.3 Fiscal Accounting

Much of the financial accounting for the institution is centralized (along with that from the other

seven institutions in the system) in the state vocational offices. Year-end financial data from the state records was the primary source of cost information. This was supplemented by information derived from a recently completed cost study for the institution for the same fiscal period. Since accounting and other administrative services provided by the state vocational offices are of a direct nature, an appropriate portion of these costs are included in institutional cost figures.

3.6.8 Site H

Site H is a two-year postsecondary institution located in the Midwest offering both vocational and transfer (basic) programs. Twenty-six vocational programs are offered and 1800 vocational students are served by 82 FTE instructors. The transfer division is of approximately the same size, serving 1500 students.

3.6.8.1 Program Data

Each vocational course at the institution is coded with the four-digit HEGIS code. The program oriented accounting system facilitated aggregation of data at the program level. Information was taken from year-end institution reports as well as from a cost study completed recently for state purposes.

3.6.8.2 Student Accounting

Full-time equivalency for both vocational and transfer students is determined on the basis of credit hours. The institution operates two academic semesters and two summer sessions. A student FTE is defined as 30 credit

Table 3.11

DIFFERENTIAL COST RESULTS FROM SITE H

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
BASIC	1,534	2,405,143	1,568	1.00
AGRICULTURE 01	35.5	46,479	1,309	0.83
DISTRIBUTIVE ED. 04	36.2	53,873	1,488	0.95
HEALTH OCCUP. 07	206	494,615	2,401	1.53
Nursing 07.03	131.2	294,784	2,247	1.43
Occupational Therapy 07.04	25.4	55,657	2,191	1.40
Bio-Medical 07.08	22.9	52,437	2,290	1.46
Misc. Health Occupations Ed. 07.09	26.5	91,737	3,462	2.21
OFFICE OCCUP. 14	380.1	518,094	1,363	0.87
Accounting & Computing Occupations 14.01	172.5	169,387	982	0.63
Bus. Data Processing Systems Occupations 14.02	46.2	111,094	2,405	1.53
Mail Clerk 14.04	38.8	74,020	1,908	1.22
Administrative Secretary 14.07	66.8	102,390	1,533	0.98
Banking/Credit 14.08	55.8	61,203	1,097	0.70
TECHNICAL ED. 16	49.6	145,261	2,929	1.87

Table 3.11 (cont'd)

DIFFERENTIAL COST RESULTS FROM SITE H

PROGRAM	FTE STUDENTS	TOTAL COSTS	COSTS/FTE	COST INDEX
TRADE/IND. OCC. 17	394	920,544	2,336	1.49
Auto Services 17.03	37.8	98,388	2,602	1.66
Aircraft Mechanics 17.04	53.7	279,272	5,201	3.32
Commercial Art 17.07	19.5	39,187	2,010	1.28
Construction & Maintenance Trades 17.10	25.9	70,731	2,731	1.74
Drafting 17.13	56.4	147,002	2,606	1.66
Graphic Arts 17.19	37.4	106,408	2,845	1.81
Metalworking 17.23	22.7	60,285	2,656	1.69
Firetraining 17.28	126	102,186	811	0.52
Quantity Food 17.29	14.6	17,085	1,170	0.75
TOTAL	1,101.4	2,178,866	1,978	1.26

hours over the course of the academic year.

3.6.8.3 Fiscal Accounting

This institution utilizes a program oriented accounting system based primarily on computerized accounting records. Year-end financial records of the institution, along with data supplied by the cost study completed for state purposes, were employed in the cost determination process.

3.6.9 Site I

Site I, a postsecondary vocational technical institution located in the Southeast, was unable to complete the data collection requirements of the model. The accounting system of the institution is not program oriented and it was not possible (within the resources of this study) to gather needed data. Data were collected for one subprogram but the required time and effort was nearly equivalent to that of other entire LEA's in the study. Since this LEA has a large enrollment with multiple campus locations, further data collection efforts were abandoned.

While it would have been possible to replace this site with another where data collection would have been possible, the study team retained Site I as an example that there are at least some institutions at which it may not be realistic to collect differential cost data. Consideration needs to be given as to the appropriateness of excluding such LEA's from the nationwide survey.

IV. SAMPLING PLAN

4.1 INTRODUCTION

A major effort of this study was to develop a sampling plan which could be implemented when and if a nationwide survey were actually undertaken. The sampling plan presented in this chapter is unique in many respects. No definition of the universe of subprograms could be secured and hence the sampling plan is built around the "probability" of finding subprograms at a given sample site. A second major consideration in developing the plan was the assumption that because of time and resources required to collect data for any given subprogram at a site, all subprogram data at the site would be collected. (In essence, all data must be collected in order to develop the differential cost of any given subprogram.) A third consideration of the sampling plan was a consequence of the first problem discussed above. Because the universe could not be defined, the sampling plan needed to provide a means to "define", at least selected portions of, the universe when the actual sample would be drawn.

The sampling plan that follows is built around these considerations. It is subdivided into considerations related to secondary, postsecondary technical institutions and community colleges and considerations related to four year institutions.

4.2 SOURCES USED TO IDENTIFY THE UNIVERSE

In the original RFP and the EMS proposal, it was indicated that the populations to be studied would consist of all secondary institutions with vocational programs, all postsecondary institutions (such as community colleges and postsecondary technical

institutions) with vocational programs two years or less in length, and all higher education institutions (four-year or greater) with vocational programs requiring two years or less. Further, all institutions were to be public supported.

After EMS began work on the project, it soon became apparent that there was no specific way of defining the populations in a manner usually associated with such studies. There did not exist any single listing or enumeration of the institutions with the necessary data to be used in determining the populations and sampling procedures and strategies. Consequently, it was decided, in discussions with the project officer, that the definition of the population for secondary and postsecondary institutions would be based upon the data tapes available from the "National Study of Vocational Education Systems and Facilities" prepared by the Westat Corporation and Institutional Development Associates, Inc. (Westat, 1978) under contract to the U.S. Office of Education. Since the published reports of this project did not have the necessary information tabulated for sampling purposes, copies of the original data tapes were purchased by EMS. For the definition of the population for four-year or greater institutions, the survey of "Degrees and Other Formal Awards conferred between July 1, 1976 and June 30, 1977" (HEGIS, 1977) was selected. As with the facilities study, the published documents did not provide tabulations in sufficient detail, so a copy of the original data tape was purchased, along with copies of the questionnaire and other data base documentation.

Using the facility study as a definition of the population for secondary, postsecondary technical institutions and community colleges, hereafter referred to as secondary-TICC, presented two major problems: (1) this study was not a "repetitive" study but rather a "one-shot

survey." Therefore, it will gradually become outdated as the time increases between the facilities study data collection (1977) and any future nationwide differential cost survey; (2) the primary consideration in the facilities study was, rightly, facilities and not vocational programs or subprograms. Therefore, it was not possible in most cases to directly associate the presence or absence of a particular vocational program with a particular educational institution. The sampling strategy discussed in a later section attempts to deal with this first problem through the use of a cluster sampling procedure based on geographic area. (As areas are selected, the "census" of institutions in that area, can be more accurately determined by mail, telephone, or on-site investigation.) To some extent, the proposed sampling strategy for secondary-TICC institutions will also counteract the second problem. After an area is selected and institutions are determined, they can be efficiently surveyed for the presence or absence of particular programs and subprograms.

The degrees granted tape appears to be an excellent source for defining the population of four-year institutions offering vocational programs of two years or less in length and it is repeated annually. The only two disadvantages are: (1) there is usually a year or more delay from the time the information is collected until it is available in machine readable form; (2) since it is based on degrees granted in particular vocational programs, it would be possible to miss some programs in small institutions or programs that do not produce graduates during a particular year. However, neither of these disadvantages are likely to produce any major problems.

4.3 DESCRIPTION OF THE SECONDARY-TICC UNIVERSE

Two tapes contained the raw data from the vocational education facilities study, originally prepared by the Westat Corporation

(Westat, 1978). The first tape contained address information for 8,467 secondary-TICC institutions. The original tape contained 8,468 institutions. After sorting by institution identification number, one duplicate was found in the original tape, resulting in the decrease to 8,467. The only information of use on this tape was the 7 digit institution identification number, the zip code, and the state or territory code which permits categorization by region.

The second tape contained the questionnaire data, (secured by either mail or telephone). This tape contained 185,845 records. Since the number of records per institution may vary from a minimum of 10 to as many as 60 or 70, (depending on the number of facilities reported) it was not immediately known how many individual institutions this represented. Further analysis indicated that 6,708 separate institutions were represented on this tape. Data from this tape then permitted the identification of the number and type of facilities at the institutions, the type of community or demographic area in which the institution is located, the type of institution and its size, based on the number of students served annually.

Institution, as defined in the Westat study (Westat, Volume III, pages 15 - 25), consisted of all public secondary and two-year postsecondary institutions...administered by a public school system or free-standing two-year postsecondary educational institutions or systems. Westat explicitly excluded institutions administered directly by, or as a branch campus of, institutions of higher education. Institutions (including two-year postsecondary institutions) operated under a board of higher education, but not as a adjunct of a higher education institution, were included. The term institution might better be thought of as a campus location.

On the actual questionnaire, parent institutions having multiple campuses were directed to complete the instrument for that campus only. Questionnaires were to be completed by the other campuses independently. Since, however, this was basically a local decision, there exists the possibility of some confusion between single campus and multiple campus institutions. As indicated in the later sections describing the sampling plan, these confusions can be resolved when the primary sampling units are selected for the study.

After sorting and merging both tapes, based on the 7 digit institution identification number, a program was written which reduced the rather formidable amount of information gathered by the questionnaires to the more limited number of variables to be used in determining the sampling framework. When this combined file was analyzed it was found that only 6,057 institutions had complete data (address and questionnaire responses). Two thousand four hundred ten institutions appeared only on the address file with no corresponding questionnaire data. Six hundred fifty one institutions appeared only on the questionnaire file with no corresponding entry on the address file. The following paragraphs present some descriptive information obtained from these data files.

Table 4.1 presents the secondary-TICC frequencies for each of the census regions and a fifth category consisting of the territories. (Table 4.2 designates the states within each of the census regions.) This is presented for the institutions with complete data as well as those with only address information. With reference to the territory category, Puerto Rico accounts for 80 of the 84 entries without questionnaire data and 4 of the 5 entries with complete data. It would appear that this is the only "territory" that could be meaningful in the sampling framework. Among the 4 census regions, all 50 states are represented.

Table 4.1

DISTRIBUTION OF THE NUMBER OF SECONDARY-TICC INSTITUTIONS BY REGION AND DATA AVAILABILITY

Census Region	No Data (1)	Complete Data (2)	Total
Northeast	512	1170	1682
North Central	734	1984	2718
South	732	1916	2648
West	348	982	1330
Territory	84	5	89
Total	2410	6057	8467

(1) File contained address data only.
(2) File contained address data as well as other data of interest.

Table 4.3 tabulates the number of facilities reported on the questionnaires by the institutions. The smallest number of facilities reported was one. This was reported by a total of 55 institutions. As indicated in the table, a total of 189 institutions have reported 4 or fewer facilities. The existence of these institutions on the tape is not completely understood since the questionnaire coding directions seem to indicate that institutions with fewer than 5 facilities were not to be included. The largest number of facilities reported by a single institution was 53.

When the institutions are tabulated by community size and demographic characteristics, the resulting distribution is as presented in Table 4.4. An unexpectedly large number (972) ended up categorized as "other".

Table 4.5 presents the number of institutions categorized by type whether they are designated area vocational schools, and whether address data only is available versus complete questionnaire data and address

Table 4.2

DESIGNATION OF STATES BY CENSUS REGION

Northeast	North Central	South	West
1	2	3	4
CT Connecticut	IL Illinois	AL Alabama	AK Alaska
DE Delaware	IN Indiana	AR Arkansas	AZ Arizona
ME Maine	IA Iowa	FL Florida	CA California
MA Massachusetts	KS Kansas	GA Georgia	CO Colorado
NH New Hampshire	MI Michigan	KY Kentucky	HI Hawaii
NJ New Jersey	MN Minnesota	LA Louisiana	ID Idaho
NY New York	MO Missouri	MD Maryland	MT Montana
PA Pennsylvania	NE Nebraska	MS Mississippi	NV Nevada
RI Rhode Island	ND North Dakota	NC North Carolina	NM New Mexico
VT Vermont	OH Ohio	OK Oklahoma	OR Oregon
	SD South Dakota	SC South Carolina	UT Utah
	WI Wisconsin	TN Tennessee	WA Washington
		TX Texas	WY Wyoming
		VA Virginia	
		WV West Virginia	
		DC District Of Columbia	

Territories
5
AS American Samoa
CZ Canal Zone
GU Guam
PR Puerto Rico
TT Trust Territories
VI Virgin Islands

Table 4.3

DISTRIBUTION OF THE NUMBER OF SECONDARY-TICC INSTITUTIONS BY NUMBER OF FACILITIES AVAILABLE

Facilities (1)	Institutions		Total
	No Data	Complete Data	
1-4	11	178	189
5-10	321	1960	2281
11-15	206	1799	2005
16-20	78	1249	1327
21-30	34	766	800
31-53	1	105	106
Total	651	6057	6708

(1) Facilities were defined such as; Agricultural Production, Agricultural Mechanics, Greenhouse, Hotel/Motel, etc. For a complete listing see Table 4.6.

Table 4.4

DISTRIBUTION OF THE NUMBER OF SECONDARY-TICC INSTITUTIONS BY DEMOGRAPHIC CHARACTER, SIZE AND TYPE OF COMMUNITY

Community	No Data	Complete Data	Total
Central City or Suburb - > 500,000	99	1168	1267
Central City or Suburb - 100,000 - 500,000	63	721	784
City or Town 25,000 - 100,000	120	1042	1162
Town or Region 0 - 25,000	332	2191	2523
Other	37	935	972
Total	651	6057	6708

Table 4.5

DISTRIBUTION OF THE NUMBER OF SECONDARY-TICC INSTITUTIONS BY TYPE

Type	No Data			Complete Data	
	Area Vocational School	Non-Area Vocational School		Area Vocational School	Non-Area Vocational School
Comprehensive HS	32	546		430	3522
Vocational HS	0	4		150	71
Vocational Center	39	17		654	136
Tech. Institute	1	4		47	94
Community College	1	5		179	514
Unknown	2	0		212	48
Total	75	576		1672	4385
	651			6057	

information. Table 4.5 also shows that a relatively large number of institutions are unknown or not assertained as to type.

As was discussed previously, the facilities tape listed the presence of facilities at institutions rather than the presence of vocational programs. In order to make use of this information, it was necessary to develop a method for "cross-walking" from facilities to programs. This cross-walk is provided in Table 4.6 and will be referenced in the following sections dealing with sampling strategies for secondary and postsecondary institutions. Table 4.6 is divided into several sections corresponding to broad program areas such as agriculture, distributive education, health occupations, etc. The first two columns in the table identify the facilities and code number used on the facilities study tape. The third and forth columns identify program names and the associated Handbook VI code numbers that are "certain" to be present in an institution if a particular facility

Table 4.6

DESIGNATION OF HANDBOOK VI PROGRAMS

AS "CERTAIN", "POSSIBLE", OR "NOT PRESENT"

BASED ON FACILITY CODES IN SECONDARY-TICC INSTITUTIONS

Table 4.6
AGRICULTURE PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
101	Agricultural Production	01.01	Agricultural Production	01.02 01.04 01.06 01.07	Agri. Supplier/Services Agricultural Products Agricultural Resources Forestry Production
102	Agricultural Mechanics	01.03	Agricultural Mechanics		
103	Greenhouse	01.05	Ornamental Horticulture		
104	Horticulture and Related	01.05	Ornamental Horticulture		
106	Other Agriculture			01.02 01.04 01.06 01.07	Agri. Supplier/Services Agricultural Products Agricultural Resources Forestry Production

Table 4.6 (cont.)
DISTRIBUTIVE EDUCATION PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
201	General Merchandising	04.08	General Merchandising	04.01	Advertising Services
				04.02	Apparel & Accessories
				04.03	Automotive
				04.04	Finance and Credit
				04.05	Floristry
				04.06	Food Distribution
				04.07	Good Services
				04.09	Hardware, Building Mat., Farm & Garden Supplies and Equipment
				04.10	Home Furnishings
				04.12	Industrial Marketing
				04.13	Insurance
				04.14	International Trade
				04.15	Personal Services
				04.16	Petroleum
				04.17	Real Estate
				04.18	Recreation & Tourism
				04.19	Transportation
202	Hotel/Motel	04.11	Hotel and Lodging	04.18	Recreation & Tourism
205	Other Marketing & Distributive Ed. Programs			04.01	Advertising Services
				04.02	Apparel & Accessories
				04.03	Automotive
				04.04	Finance and Credit
				04.05	Floristry
				04.06	Food Distribution
				04.07	Good Services
				04.08	General Merchandise
				04.09	Hardware, Building Mat., Farm & Garden Supplies and Equipment
				04.10	Home Furnishing
				04.12	Industrial Marketing
				04.13	Insurance
				04.14	International Trade
				04.15	Personal Services
				04.16	Petroleum
				04.17	Real Estate
				04.18	Recreation & Tourism
				04.19	Transportation

Table 4.6 (cont.)
HEALTH OCCUPATION PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
401	Nursing	07.03	Nursing	07.02 07.09	Medical Lab Technology Misc. Health Occup.
402	Medical Assistance	07.09	Miscellaneous Health Occupations	07.02 07.03	Medical Lab Technology Nursing
403	Medical Lab Assistance	07.02	Medical Laboratory Technology	07.03 07.09	Nursing Misc. Health Occup.
404	Dental Assistant	07.01	Dental		
405	Dental Lab Assistant	07.01	Dental		
406	Inhalation (Respiratory) Therapy	07.09	Miscellaneous Health Occupations	07.03 07.04 07.07	Nursing Rehabilitation Environmental Health
407	Physical Therapy	07.04	Rehabilitation	07.03 07.07 07.09	Nursing Environmental Health Misc. Health Occup.
408	Occupational Therapy	07.04	Rehabilitation	07.03 07.07 07.09	Nursing Environmental Health Misc. Health Occup.
409	Operating Room Assistant	07.03	Nursing		
411	Other Health Occupations			07.05 07.06 07.07 07.08	Radiologic Ophthalmic Environmental Health Mental Health Tech.

Table 4.6 (cont.)
HOME ECONOMICS PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
301	Child Development	09.02	Occupational Home Economics		
302	Sewing and Tailoring	09.02	Occupational Home Economics		Since there is only one occupational program category in Home Economics (09.02), any Home Economics facility would have this program. There is no other (09.99) for Home Economics.
303	Foods & Nutrition	09.02	Occupational Home Economics		
304	Interior Decorating	09.02	Occupational Home Economics		
306	Other Home Economics	09.02	Occupational Home Economics		

Table 4.6 (cont.)
OFFICE OCCUPATIONS PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
501	Typing	14.09	Typing and Related Occupations	14.03	Filing, Off. Mach., & Gen. Off. Cler. Occup.
				14.04	Info. Communication
				14.07	Steno, Secret. & Related
502	Stenography	14.07	Stenographic, Secretarial and Related	14.03	Filing, Off. Mach., & Gen. Off. Cler. Occup.
				14.04	Info. Communication
				14.09	Typing & Related Occup.
503	Accounting	14.01	Accounting and Computing	14.02	Business Data Processing
504	Office Machines	14.03	Filing, Office Mach., & General Office Clerical Occupation	14.04	Info. Communication
				14.07	Steno, Secret. & Related
				14.09	Typing & Related Occup.
505	Office Practices	14.07	Stenographic, Secretarial and Related	14.03	Filing, Off. Mach., & Gen. Off. Cler. Occup.
				14.04	Info. Communication
				14.05	Materials Support
				14.09	Typing & Related Occup.
508	Other Office Occupation Programs			14.02	Business Data Processing
				14.04	Info. Communication
				14.05	Materials Support
				14.06	Personnel Training
				14.08	Supervisory & Admin. Management

Table 4.6 (cont.)
TECHNICAL/TRADE AND INDUSTRIAL PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
601	Air Conditioning-Refrigeration	17.01 17.30	Air Conditioning Refrigeration	16.01	Engineer.-Related Tech.
602	Appliance Repair	17.02	Appliance Repair	17.15	Electronics Occup.
603	Auto Mechanics	17.03	Automotive Services	17.12	Diesel Mechanic
604	Auto Body & Fender	17.03	Automotive Services	17.12	Diesel Mechanic
605	Aviation Mechanics	17.04	Aviation Occupation	17.05 17.15 17.21	Blueprint Reading Electronics Occup. Instrument Maint. & Repair Occupations
606	Building Construction	17.10	Construction and Maintenance Trades	16.01 17.13 17.14	Engineer.-Related Tech. Drafting Occupations Electrical Occupations
607	Business Machine Repair	17.06	Business Machine Maintenance		
608	Chemical Technology			17.20 17.27	Industrial Atomic Energy Occupations Plastics Occupations
609	Civil Technology	16.01	Engineering - Related Technology	17.10	Construc. & Maint. Trades
610	Commercial Art	17.07	Commercial Art	17.09 17.19	Commercial Photography Occupations Graphic Art Occupations
611	Cosmetology	17.26	Personal Services		

Table 4.6 (cont.)
TECHNICAL/TRADE AND INDUSTRIAL PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
612	Data Processing (Computer)	14.02	Business Data Processing Systems Occupations		
613	Diesel Mechanics	17.12	Diesel Mechanic	17.03 17.10 17.32	Automotive Services Constr.& Maint. Trades Stationary Energy Sources Occupations
614	Drafting	17.13	Drafting Occupations	17.05 17.23 17.99	Blueprint Reading Metalworking Occup. Other T & I
615	Electricity	17.14	Electrical Occupations	17.10	Constr.& Maint. Trades
616	Electronics	17.15	Electronics Occup.	17.05	Blueprint Reading
617	Environmental Technology	16.01	Environmental-Control Technology		
618	Fire Science	16.06 17.28	Miscellaneous Technical Education Public Service Occup.		
619	Food Service (Culinary Arts)	17.29	Quantity Food Occup.		
620	Heavy Equipment Maintenance	17.10	Construction and Maintenance Trades	17.12	Diesel Mechanic
621	Masonary	17.10	Construction and Maintenance Trades	16.01 17.13 17.14	Engineer.-Related Tech. Drafting Occupations Electrical Occupations
622	Machine Shop	17.23	Metalworking Occupations	17.13 17.24	Drafting Occupations Metallurgy Occupations

Table 4.6 (cont.)
TECHNICAL/TRADE AND INDUSTRIAL PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
623	Mechanical Technology	16.01	Engineering - Related Technology	17.10	Constr.& Maint. Trades
624	Painting & Decorating	17.10	Construction and Maintenance Trades		
625	Photography	17.09	Commercial Photography Occupations	17.07 17.19	Commercial Art Graphic Art Occup.
626	Plumbing	17.10	Construction and Maintenance Trades	16.01 17.13 17.14	Engineer.-Related Tech. Drafting Occupations Electrical Occupations
627	Police Science	16.06 17.28	Misc. Technical Education Public Service Occup.		
628	Printing & Graphics	17.19	Graphic Art Occup.	17.07 17.09	Commercial Art Commercial Photography Occupations
629	Radio - T.V.	17.15	Electronics Occupations	17.05	Blueprint Reading
630	Sheet Metal	17.23	Metalworking Occupations	17.13 17.24	Drafting Occupations Metallurgy Occupations
631	Small Engine Repair	17.31	Small Engine Repair		
632	Textiles	17.33	Textile Production and Fabrication		
633	Welding	17.23	Metalworking Occupations	17.13 17.24	Drafting Occupations Metallurgy Occupations

Table 4.6 (cont.)
TECHNICAL/TRADE AND INDUSTRIAL PROGRAMS

No.	Facilities	Certain		Possible	
		No.	Name	No.	Name
634	Woodworking	17.36	Woodworking	17.10	Constr.& Maint. Trades
639	Other T/T & I Programs			16.02	Agricultural - Related Technology
				16.03	Health - Related Tech.
				16.04	Office - Related Tech.
				16.05	Home Economics - Related Technology
				16.06	Miscellaneous Technical Education
				17.05	Blueprint Reading
				17.08	Commercial Fishery Occupations
				17.11	Custodial Services
				17.16	Fabric Maintenance Serv.
				17.17	Foremanship, Supervision & Management Develop.
				17.20	Industrial Atomic Energy Occupations
				17.21	Instrument Maintenance & Repair Occupations
				17.22	Maritime Occupations
				17.24	Metallurgy Occupations
				17.27	Plastics Occupations
				17.32	Stationary Energy Sources Occupations
				17.34	Leatherworking
				17.35	Upholstering

is present. The fifth and sixth columns identify program names and corresponding Handbook VI program code numbers that could "possibly" be at an institution with a given facility. Any program not listed with a particular facility type is assumed to be "not present" based on the facility indicated. Only specific Handbook VI programs were used. The "other" programs (such as 01.99) were not used.

There is, of course, no way to be absolutely sure that this "cross-walk" procedure is entirely correct, but this is not particularly a problem. It was necessary to develop the table, as will be indicated later, in order to develop a sampling strategy. The strategy finally recommended will not be limited by any errors in this table, since it is proposed that a survey of institutions in primary sampling units (see later definition) be undertaken to specifically define the presence or absence of particular programs and/or subprograms.

4.4 DESCRIPTION OF THE FOUR-YEAR INSTITUTION UNIVERSE

The degrees granted tape consisted of 155,375 records of information. As with the facilities study tape, a variable number of records was present for each institution, depending upon what information was available from that institution. A computer program was written to select the information that would be useful in sample determination. This consisted of the state in which an institution was located (permitting classification by census region), the size of the institution, and whether there had been graduates during the 1976-77 fiscal year in 75 programs (including 6 "other" designations in 6 broad program areas).

An institution was deleted from consideration if it did not produce at least one graduate in one of the programs. Only publicly controlled institutions were selected. Also, in order to avoid overlap with the facilities study tape (for example, with community

colleges) only four-year or greater institutions were selected.

Institution, as defined on the HEGIS tape, consists of campuses, branches, or other entities separately certified with their own FICE code number. Branches, campuses, or other organizational entities not separately certified are included with an appropriate certified institution. In general, it appears that institution may thus be considered as a campus location, although certain "institutions" might consist of several locations when the branches are not separately certified.

The specific programs selected from the tape are identified in Table 4.7. These are identified in the degrees granted publications and the questionnaire (NCES Form 2300-21,3/77). Part C of the questionnaire consists of programs organized under three major sections: (1) arts and science or general programs, not organized as occupational curriculums; (2) science or engineering related organized occupational curriculums; (3) non-science and non-engineering related organized occupational curricula. Only programs in Sections 2 and 3 (organized occupational curricula) were selected. The programs selected may be considered under the following broad categories: (1) data processing technologies; (2) health services and paramedical technologies; (3) mechanical and engineering technologies; (4) natural science technologies; (5) business and commerce technologies; (6) public service related technologies. Most programs do not correspond, in one-to-one relationship, to the program definitions in Handbook VI. However, they can be made to correspond rather closely to clusters of specific Handbook VI programs.

When the degrees granted tape was processed, only 259 four-year institutions were identified with at least one graduate in at least one of the 75 occupational programs. In Table 4.7 the programs are

Table 4.7

FOUR-YEAR INSTITUTIONS WITH ONE OR MORE GRADUATES
IN DESIGNATED PROGRAMS

HEGIS Program Number	Program Description	Number of Institutions
5101	Data processing technologies, general	41
5102	Key punch operator and other input preparation technologies	1
5103	Computer programmer technologies	19
5104	Computer operator and peripheral equipment operation technologies	3
5105	Data processing equipment maintenance technologies	2
5199	Other Data Processing Technologies	1
5201	Health services assistant technologies, general	16
5202	Dental assistant technologies	19
5203	Dental hygiene technologies	41
5204	Dental laboratory technologies	6
5205	Medical or biological laboratory assistant technologies	23
5206	Animal laboratory assistant technologies	5
5207	Radiologic technologies (X-ray, etc.)	42
5208	Nursing, R.N. (less than 4-year program)	95
5209	Nursing, practical (L.P.N. or L.V.N. less than 4-year program)	22
5210	Occupational therapy technologies	2
5211	Surgical technologies	4
5212	Optical technologies (include ocular care, ophthalmic, optometric technologies)	4
5213	Medical record technologies	11
5214	Medical assistant and medical office assistant technologies	15
5215	Inhalation therapy technologies	21

Table 4.7 (cont.)

FOUR-YEAR INSTITUTIONS WITH ONE OR MORE GRADUATES IN DESIGNATED PROGRAMS

HEGIS Program Number	Program Description	Number of Institutions
5216	Psychiatric technologies (include mental health aide programs)	15
5217	Electro diagnostic technologies (include E.K.G., E.E.G., etc.)	4
5218	Institutional management technologies (rest home, etc.)	1
5219	Physical therapy technologies	3
5299	Other Health Technologies	11
5301	Mechanical and engineering technologies, general	43
5302	Aeronautical and aviation technologies	16
5303	Engineering graphics (tool and machine drafting and design)	28
5304	Architectural drafting technologies	31
5305	Chemical technologies (include plastics)	12
5306	Automotive technologies	20
5307	Diesel technologies	12
5308	Welding technologies	13
5309	Civil technologies (surveying photo-grammetry, etc.)	34
5310	Electronics and machine technologies (television appliance, office machine repair, etc.)	54
5311	Electromechanical technologies	20
5312	Industrial technologies	24
5313	Textile technologies	4
5314	Instrumentation technologies	5
5315	Mechanical technologies	25
5316	Nuclear technologies	2
5317	Construction and building technologies (carpentry, electrical work, plumbing, sheetmetal, air conditioning, heating, etc.)	37

Table 4.7 (cont.)

FOUR-YEAR INSTITUTIONS WITH ONE OR MORE GRADUATES
IN DESIGNATED PROGRAMS

HEGIS Program Number	Program Description	Number of Institutions
5399	Other Mechanical & Engineering Technology	6
5401	Natural science technologies, general	10
5402	Agriculture technologies (include horticulture)	37
5403	Forestry and wildlife technologies (include fisheries)	7
5404	Food services technologies	21
5405	Home economics technologies	17
5406	Marine and oceanographic technologies	2
5407	Laboratory technologies, general	3
5408	Sanitation and public health inspection technologies (environmental health technologies)	6
5499	Other Natural Science Technologies	4
5001	Business and commerce technologies, general	58
5002	Accounting technologies	54
5003	Banking and finance technologies	12
5004	Marketing, distribution, purchasing, business, and industrial management technologies	52
5005	Secretarial technologies (include office machines training)	141
5006	Personal service technologies (stewardess, cosmetologist, etc.)	8
5007	Photography technologies	1
5008	Communications and broadcasting technologies (radio/television, newspapers)	15
5009	Printing and lithography technologies	8
5010	Hotel and restaurant management technologies	5

Table 4.7 (cont.)

FOUR-YEAR INSTITUTIONS WITH ONE OR MORE GRADUATES IN DESIGNATED PROGRAMS

HEGIS Program Number	Program Description	Number of Institutions
5011	Transportation and public utility technologies	11
5012	Applied arts, graphic arts, and fine arts technologies (include advertising design)	32
5099	Other Business & Commerce Technologies	11
5501	Public service technologies, general	10
5503	Education technologies (teacher aide and 2-year teacher training programs)	31
5504	Library assistant technologies	11
5505	Police, law enforcement, corrections technologies	86
5506	Recreation and social work related technologies	31
5507	Fire control technology	11
5508	Public administration and management technologies	9
5599	Other Public Service Technologies	7

listed along with the number of four-year institutions identified with each program. The largest number of institutions are identified with the secretarial technologies (141) followed by nursing (95) and police technologies (86). It can be observed that 30 of the program areas (these include the "general" and "other" designations) are identified with 10 or fewer institutions.

Table 4.8 categorizes the population of four-year institutions (259) by the number of programs identified at each institution. The largest number of programs at a single institution was 40. The next largest number of programs at a single institution was 26. Observation of Table 4.8 indicates that almost one-fifth of the institutions

are identified by only one program. Less than one-fourth of the institutions have 10 or more programs.

Table 4.8

DISTRIBUTION OF THE NUMBER OF FOUR-YEAR INSTITUTIONS BY NUMBER OF VOCATIONAL PROGRAMS

Number of Programs	Number of Institutions	Percent
1	49	19
2	43	17
3	33	13
4-5	45	17
6-9	31	12
10-14	32	12
15-40	26	10
Total	259	100

Table 4.9 indicates the number of four-year institutions in each of the census regions and the territories. When compared with the distribution of secondary-TICC institutions by census region, it is apparent that there is a greater proportion of four-year or greater institutions in the southern region and a smaller proportion in the northeast and northcentral region.

Table 4.10 presents the population of four-year institutions categorized by enrollment size. The median enrollment size would be slightly greater than 5,000.

The data available on the degrees granted tape does not permit the classification of four-year institutions by demographic character

Table 4.9

DISTRIBUTION OF THE NUMBER OF FOUR-YEAR INSTITUTIONS BY CENSUS REGIONS

Region	Number of Institutions	Percent
Northeast	36	14
North Central	76	29
South	111	43
West	30	12
Territories	6	2
Total	259	100

Table 4.10

DISTRIBUTION OF THE NUMBER OF FOUR-YEAR INSTITUTIONS BY ENROLLMENT SIZE CATEGORIES

Enrollment Size Category	Number of Institutions	Percent
0-999	12	5
1000-2499	58	22
2500-4999	46	18
5000-9999	63	24
10,000-19,999	43	17
20,000 +	37	14
Total	259	100

(size and type of community). This could be done, however, when an actual sample is selected. Similarly, the institutions could be further classified by type, highest level of offering, and other variables. To do this, however, would require the collating of various data bases in the preparation of a more complex data file. If attempted, this would need to be done in a limited way or else very small or empty cells in the design would occur.

4.5 DEVELOPMENT OF SAMPLING STRATEGIES

Since it was not possible to develop a common data file and data source for secondary (including technical institutes and community colleges) and four-year institutions, it was decided to treat the development of sampling strategies separately for these two populations. For example, the size distributions of secondary-TICC versus four-year institutions differs so drastically that it would be impossible to consider a common frame. Community and demographic data are missing on the available data file for four-year institutions.

As indicated in earlier sections, the secondary-TICC institutions with vocational programs are far greater in number and student enrollments than the four-year institutions. Since this population is agreed to be of primary concern, it was given the main consideration in the development of sampling strategies. The proposed strategy for selecting secondary-TICC institutions was developed first and then a process for selecting four-year institutions was suggested based on the proposed strategy for selecting secondary-TICC institutions.

In addition to being unable to associate particular programs with particular secondary-TICC institutions, another problem exists

for four-year as well as secondary-TICC institutions. There are no reliable estimates of possible population mean and standard deviation values. No studies exist which have developed cost data in the manner suggested by this study. EMS pilot study institutions are not numerous enough to provide stable estimates. Therefore, "guessestimates" are used in latter sections to attempt to show the likely effects of the sampling plans in actual dollar estimates.

4.5.1 Sampling Procedure for Secondary, Postsecondary Technical Institutions and Community Colleges

The proposed sampling frames consist of census region (northeast, north central, south, and west; enrollment size (above and below an approximate median enrollment of 600); community type (small consisting of towns or regions 25,000 or less and the "other" category, and large consisting of cities and towns greater than 25,000; and two institutional types (secondary and postsecondary). Available data would support additional frames but are included to avoid empty or very small cell frequencies. Also, as will be indicated later, it is impossible to directly consider all of these dimensions in the sampling procedure, since it is not always possible to be certain that particular programs will be found in particular institutions.

It will be noted that only the four census regions are being used for geographic distribution as the territories are omitted. Earlier tabulations indicated that only 89 secondary-TICC institutions are located in the territories. Eighty-four of these are found in Puerto Rico. Only five of the institutions (four from Puerto Rico) responded to the vocational education facilities study questionnaire. This does not provide enough information to permit the development of a sampling procedure

including the territories or the estimation of errors. It is suggested that either the territories be omitted from this proposed study or if this is not desired, a separate census and inventory be taken of these institutions and they be treated as a third population. Since 84 of the 89 institutions are in Puerto Rico this would not present significant problems since a study team could be sent to Puerto Rico to simultaneously define the population, develop the sampling procedure, and collect the necessary data.

In the following sections dealing with sample selection procedures and estimation procedures for the secondary-TICC institutions, it should be pointed out that the definition of "program" is quite flexible and can be changed without altering the basic sample selection strategy or estimation procedure. In the second stage sampling procedure, where a program is first considered, the examples are at the subprogram level of the Handbook VI classification scheme, such as 01.01 Agricultural Production. Program could just as well be defined as a higher aggregation, such as 01.00 Agriculture. In fact, if program were to be omitted as a variable entirely (assuming the decision was made to consider vocational education as "one program"), then the second stage strategies and estimation procedures would remain the same except there would be only three strata-TICC, secondary, and unclassifiable.

The following sections outline the proposed procedure for sampling secondary-TICC institutions. It will be noted that the estimated population total in these sections has been reduced to 8,323 due to the omission of institutions in the territories and a small number of institutions for which the zip code was

not available on the Westat data file.

4.5.1.1 First Stage Sampling

First stage, or Primary Sampling Units (PSU's) would be composed of clusters of LEA's identified by the first three zip code digits in their addresses. So that each PSU would contain at least 10 LEA's, zip code regions were combined in sets of five based on the first three digits. Each PSU is then assigned to one of the four census regions. Lists of the proposed PSU's are given in Tables 4.11 through 4.14. A brief summary is given in Table 4.15.

Separate samples are to be chosen in each census region. To account somewhat for the differing sizes of the regions, it is recommended that 20% of the sample PSU's come from each of the northeast and west regions while 30% come from each of north central and south. Throughout this report it is assumed that 30 locations are to be chosen from the entire nation -- six from northeast and west, nine from north central and south. Actual choice of sample size will be discussed in a later section.

To select a sample of PSU's from a census region, it is recommended that a systematic sampling procedure be used with the selection probability for a given PSU being proportional to its "size", i.e., the number of LEA's it contains. A description of the sampling procedure can be found in Cochran (1977, pp. 265-6). The success of systematic sampling depends primarily on the order of the units before the sample is chosen. If it is desired to impose implicit geographic stratification as well as controlling somewhat for community size, two steps are necessary to obtain an ordering of the population.

Table 4.11

PRIMARY SAMPLING UNITS FOR CENSUS REGION 1 - NORTHEAST - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
11-15	32	6	26	9	17	6	21	5	6
16-20	46	7	39	14	24	8	33	6	7
21-25	30	5	25	8	16	6	23	2	5
26-30	33	5	28	11	17	5	23	5	5
31-35	13	5	8	3	5	5	4	0	9
36-40	15	3	12	7	5	3	8	1	6
41-45	15	7	8	1	7	7	3	1	11
46-50	26	5	21	12	9	5	16	1	9
51-60	28	6	22	11	11	6	19	3	6
61-65	35	7	28	7	21	7	24	4	7
66-70	56	9	47	17	30	9	42	5	9
71-75	26	12	14	0	14	12	12	2	12
76-80	71	19	52	18	34	19	45	7	19
81-85	22	4	18	3	15	4	16	2	4
86-90	34	11	23	7	15	12	19	4	11
91-100	32	15	17	6	11	15	15	1	16
101-105	58	17	41	15	25	18	38	3	17
106-110	41	20	21	10	11	20	20	1	20
111-115	91	18	73	34	37	20	68	5	18
116-120	96	29	67	34	33	29	63	2	31
121-125	61	21	40	26	13	22	37	3	21
126-130	75	35	40	22	18	35	33	7	35
131-135	69	26	43	28	15	26	39	3	27
136-140	83	26	57	27	30	26	52	3	28
141-145	96	36	60	26	34	36	56	4	36
146-150	96	31	65	27	38	31	60	4	32
151-155	61	15	46	27	19	15	40	6	15
156-160	38	9	29	16	12	10	27	2	9
161-165	30	8	22	12	10	8	22	0	8
166-170	42	10	32	16	16	10	32	0	10
171-175	35	10	25	14	11	10	24	1	10
176-180	29	6	23	12	11	6	20	3	6
181-185	16	6	10	5	5	6	10	0	6
186-190	40	13	27	10	16	14	24	3	13
191-195	57	31	26	10	15	32	24	2	31
196-200	52	18	34	4	30	18	29	5	18

Table 4.12

PRIMARY SAMPLING UNITS FOR CENSUS REGION 2 - NORTH CENTRAL - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
426-430	19	4	15	9	6	4	12	2	5
431-435	54	17	37	19	18	17	33	4	17
436-440	44	5	39	17	22	5	33	6	5
441-445	74	18	56	22	31	21	53	3	18
446-450	41	13	28	8	19	14	25	3	13
451-455	67	20	47	23	24	20	41	6	20
456-460	37	5	32	11	21	5	27	5	5
464-465	54	20	34	15	18	21	32	2	20
466-470	35	11	24	16	8	11	21	3	11
474-475	41	10	31	20	11	10	26	5	10
476-480	92	23	69	30	39	23	63	6	23
481-485	109	7	102	52	50	7	94	8	7
486-490	105	18	87	56	31	18	80	7	18
491-495	77	21	56	42	14	21	52	4	21
496-500	47	18	29	15	14	18	22	7	18
501-505	11	5	6	3	3	5	3	3	5
506-515	16	4	12	4	8	4	5	7	4
516-525	10	2	8	3	5	2	2	6	2
526-530	46	12	34	16	18	12	25	5	16
531-535	85	26	59	19	40	26	49	4	32
536-540	34	8	26	15	11	8	22	1	11
541-545	70	18	52	27	25	18	42	2	26
546-550	83	21	62	44	18	21	50	0	33
551-555	25	8	17	5	12	8	7	3	15
556-560	39	9	30	12	18	9	17	5	17
561-565	50	10	40	24	16	10	27	1	22
566-570	23	5	18	14	4	5	13	2	8
571-575	27	9	18	10	8	9	15	0	12
576-580	15	4	11	9	2	4	8	1	6
584-585	19	8	11	4	7	8	9	2	8
586-590	10	5	5	2	3	5	4	1	5
596-600	72	14	58	16	42	14	51	4	17
601-605	135	25	110	43	66	26	102	8	25
606-610	171	71	100	57	43	71	90	10	71

Table 4.12 (cont.)

PRIMARY SAMPLING UNITS FOR CENSUS REGION 2 - NORTH CENTRAL - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
611-615	125	33	92	66	26	33	86	6	33
616-620	118	27	91	66	25	27	86	5	27
621-625	129	31	98	70	28	31	93	5	31
626-630	138	28	110	86	24	28	100	10	28
631-635	29	12	17	10	7	12	13	4	12
636-640	47	17	30	22	8	17	26	4	17
641-645	23	5	18	8	10	5	13	5	5
646-650	32	10	22	15	7	10	16	6	10
651-655	29	9	20	10	10	9	18	2	9
656-660	26	8	18	10	7	9	15	2	9
661-665	13	6	7	3	4	6	4	1	8
666-670	26	15	11	6	5	15	4	4	18
671-675	37	15	22	14	8	15	10	8	19
676-680	24	5	19	13	5	6	13	3	8
681-685	38	18	20	15	5	18	17	3	18
686-690	41	11	30	27	3	11	25	5	11
691-695	14	5	9	4	5	5	6	3	5

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Table 4.13

PRIMARY SAMPLING UNITS FOR CENSUS REGION 3 - SOUTH - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
201-210	32	5	27	11	16	5	21	6	5
211-215	44	15	29	11	18	15	25	4	15
216-220	36	9	27	20	7	9	25	2	9
221-225	33	14	19	10	9	14	16	3	14
226-230	25	5	20	11	9	5	18	2	5
231-235	30	4	26	10	16	4	23	3	4
236-240	39	6	33	16	16	7	25	8	6
241-245	62	16	46	22	23	17	38	8	16
246-250	34	15	19	8	11	15	18	1	15
251-255	33	12	21	12	9	12	20	1	12
256-260	44	22	22	10	12	22	18	4	22
261-265	50	17	33	22	10	18	31	2	17
266-270	23	10	13	9	4	10	12	1	10
271-275	54	10	44	33	11	10	33	11	10
276-280	45	6	39	28	11	6	25	14	6
281-285	57	6	51	38	13	6	32	19	6
286-290	55	13	42	29	13	13	31	11	13
291-295	112	33	79	41	38	33	67	12	33
296-300	68	18	50	26	24	18	44	5	19
301-305	76	26	50	24	26	26	38	2	36
306-310	51	9	42	24	17	10	35	2	14
311-315	32	7	25	12	13	7	20	2	10
316-320	49	7	42	16	26	7	29	6	14
321-325	38	5	33	10	23	5	18	11	9
326-330	58	12	46	13	32	13	35	5	18
331-335	51	7	44	7	36	8	29	9	13
336-340	25	8	17	4	13	8	9	5	11
341-350	20	11	9	4	5	11	6	1	13
351-355	57	33	24	7	17	33	17	3	37
356-360	71	42	29	8	21	42	20	2	49
361-365	52	28	24	13	11	28	15	4	33
366-370	43	18	25	12	13	18	15	6	22
371-375	60	20	40	18	21	21	34	6	20
376-380	65	18	47	24	23	18	38	9	18

Table 4.13 (cont.)

PRIMARY SAMPLING UNITS FOR CENSUS REGION 3 - SOUTH - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
381-385	81	20	61	36	24	21	55	6	20
386-390	58	12	46	32	14	12	39	7	12
391-395	61	15	46	21	24	16	34	12	15
396-400	26	8	18	15	3	8	15	3	8
401-405	20	4	16	12	4	4	13	2	5
406-410	16	1	15	12	3	1	11	2	3
411-415	14	0	14	11	3	0	11	1	2
416-420	16	4	12	9	3	4	11	0	5
421-425	25	7	18	11	7	7	12	2	11
696-705	52	15	37	15	22	15	18	1	33
706-710	17	6	11	8	3	6	5	1	11
711-715	23	1	22	11	11	1	8	0	15
716-720	32	6	26	13	13	6	14	2	16
721-725	35	4	31	10	21	4	17	2	16
726-730	39	16	23	9	14	16	18	2	19
731-735	34	17	17	10	7	17	17	0	17
736-740	17	4	13	7	6	4	13	0	4
741-745	33	19	14	10	4	19	14	0	19
746-750	21	7	14	7	7	7	13	1	7
751-755	53	14	39	13	26	14	31	8	14
756-760	38	4	34	18	16	4	27	7	4
761-765	44	9	35	21	14	9	27	8	9
766-770	38	8	30	17	13	8	22	8	8
771-775	31	2	29	10	19	2	22	7	2
776-780	33	6	27	14	13	6	22	5	6
781-785	59	7	52	20	32	7	46	6	7
786-790	27	8	19	8	11	8	15	4	8
791-795	20	4	16	9	7	4	10	6	4
796-800	41	9	32	20	11	10	29	3	9

Table 4.14

PRIMARY SAMPLING UNITS FOR CENSUS REGION 4 - WEST - SECONDARY-TICC INSTITUTIONS

ZIP CODES	NUMBER OF INSTITUTIONS	DATA GROUP		SCHOOL SIZE			SCHOOL TYPE		
		W/O DATA	WITH DATA	SMALL	LARGE	UNKNOWN	SECONDARY	TICC	UNKNOWN
591-595	13	4	9	3	6	4	6	1	6
801-805	56	12	44	23	21	12	32	7	17
806-810	48	14	34	25	9	14	26	7	15
814-815	24	8	16	9	5	10	13	0	11
816-820	14	3	11	7	4	3	8	3	3
821-825	12	1	11	9	1	2	8	3	1
826-830	11	2	9	4	5	2	6	3	2
831-835	51	13	38	29	8	14	35	3	13
836-840	45	12	33	17	15	13	31	2	12
841-845	25	2	23	5	18	2	21	2	2
846-850	26	6	20	15	5	6	14	5	7
851-855	15	2	13	4	9	2	5	8	2
856-860	23	9	14	7	7	9	12	2	9
861-870	10	4	6	2	4	4	4	2	4
871-875	26	13	13	6	7	13	10	2	14
876-880	13	6	7	3	4	6	6	0	7
881-885	21	13	8	6	2	13	5	3	13
886-895	21	6	15	5	10	6	12	3	6
896-900	36	9	27	9	18	9	20	7	9
901-905	25	5	20	6	14	5	16	4	5
906-910	44	16	28	14	13	17	22	6	16
911-915	25	4	21	8	13	4	17	4	4
916-920	49	5	44	18	26	5	38	6	5
921-925	44	16	28	8	18	18	18	10	16
926-930	54	8	46	19	25	10	38	8	8
931-935	40	13	27	3	24	13	17	10	13
936-940	30	8	22	9	13	8	15	7	8
941-945	66	23	43	20	22	24	32	11	23
946-950	42	11	31	10	21	11	25	6	11
951-955	42	10	32	14	18	10	23	9	10
956-965	33	4	29	12	16	5	19	10	4
966-970	83	21	62	38	24	21	54	8	21
971-975	99	21	78	36	41	22	70	8	21
976-980	30	5	25	8	17	5	17	8	5
981-985	39	5	34	7	27	5	17	17	5
986-990	20	2	18	12	6	2	14	4	2
991-995	15	5	10	2	8	5	6	4	5
996-1000	19	8	11	7	4	8	8	3	8

Table 4.15

DISTRIBUTION OF THE NUMBER OF FIRST STAGE SAMPLING UNITS BY CENSUS REGION

Region	Number of PSU's	Number of Schools	Percent of Schools
Northeast	36	1680	20
North Central	51	2726	33
South	63	2628	32
West	38	1289	15
Total	188	8323	100

1) Classify each PSU as a "mostly large communities" or "mostly small communities" depending on whether more institutions in that PSU have "large" or "medium" community size classification than have "small" or "town" classifications. This creates two groups of PSU's of which the second will be larger.

2) Each of the above groups should be arranged in order of increasing zip code. These two lists, joined together, will form the frame for choosing the systematic-PPS (probability proportional to size) sample of PSU's. The procedure described in Cochran can then be applied to this list.

Some advantages and disadvantages of this sampling plan are now described - first the advantages:

1) The sampling plan is easy to execute.

2) When the population is ordered so that similar units are near each other, systematic sampling may be more accurate than many other more complicated designs.

3) The ordering recommended here uses explicit stratification based on degree of urbanization and implicit stratification on all other characteristics that vary as units become geographically distant.

4) The sample should be representative of the population with respect to variables not explicity considered in the design, i.e., institution size, institution type.

5) It insures that the primary sampling units will be scattered across the census region.

6) PPS sampling is statistically efficient if the variable of interest for the PSU, e.g., dollars spent on programs in a given cluster, is roughly proportional to the size of the cluster. It does not seem unreasonable that this should be the case.

7) With PPS sampling of PSU's, and approximately equal subsample sizes in each sample PSU, one obtains: a) more efficient statistical properties; and b) equal work loads for data collection in each PSU.

The proposed sampling plan does have one disadvantage: there is no unbiased estimator of the variance of a sample estimator. An approximation method, which should be considered conservative, is given in the section on estimation.

4.5.1.2 Second Stage Sampling

Given that a zip code region has been selected into the sample, the next step is to select a subsample of institutions from which data will be obtained. At this stage additional stratification based on type of institution (secondary or TICC), and presence or absence of key programs will be used. (Key programs are defined as those programs of interest to decision-makers. See previous discussion as to the definition of programs.) An additional stratum containing institutions for which no classifying information is available will be formed if needed.

Concerning this last stratum, it is strongly recommended that all schools in the sample PSU's be contacted (probably by telephone) prior to selecting the final sample. The purpose of this brief and inexpensive contact would be to obtain only the information necessary to place the institution in the correct stratum, i.e., institution type and information

on key programs. Ideally, the stratum of unclassified institutions will be empty, or very small.

As the purpose of this proposed study is to obtain comparable data for various educational programs, it would be desirable to have equal numbers of sample institutions for each of the programs. This is not feasible because some programs occur at more institutions than others. Before making final sampling recommendations, the rate of occurrence for seven subprograms was studied:

01.01 Agricultural Production

04.17 Real Estate

07.03 Nursing

09.02 Occupational Preparation

14.01 Accounting and Computing

16.01 Engineering-Related Technology

17.03 Automotive Services

These subprograms were selected for the following reasons: 1) they were listed as illustrative in the RFP; 2) they cover several broad program areas; 3) they offer a variety of conditions as indicated in Table 4.6 when an attempt is made to "cross-walk" from facility to program; and 4) they cover a range from frequently appearing programs to relatively rare programs.

Using data from the facilities study all responding institutions were placed into one of three groups (see description in earlier section) for each of the seven subprograms:

N = program not present

P = program possibly present

C = program certainly present

Table 4.16

OCCURRENCE RATE OF SEVEN SUBPROGRAMS FOR U.S. IN SECONDARY-TICC INSTITUTIONS

Program	Percent of Institutions		
	Not Present (1)	Possible (1)	Certain (1)
01.01	75	0	25
04.17	56	44	0
07.03	67	4	29
09.02	26	0	74
14.01	49	0	51
16.01	51	41	8
17.03	39	1	60

(1) - See Table 4.6 for definition of these terms.

Nationwide results based on 6030 institutions with adequate data are given in Table 4.16.

Study of the facilities data also revealed that only 14% of the classified institutions are TICC while 86% are secondary; therefore, attention must be paid to obtaining an adequate number of TICC's. Based on that knowledge, (and the assumption that TICC's and secondaries are equally important) the following plan for selecting sample institutions is outlined.

a) Place each institution in the PSU in one of five strata: (it is assumed that several "key" programs will be identified, i.e., programs that are of greatest importance to the researchers.)

1. TICC - contains at least one key program
2. TICC - no key program
3. Secondary - contains at least one key program
4. Secondary - no key program
5. Unclassifiable

b) Sample sizes for each of the strata will vary from PSU to PSU, because some strata will be empty, or not contain the desired number of institutions, so the following guidelines should be used (based on 10-12 sample institutions/stratum):

Stratum 1 - select up to four institutions

Stratum 2 - select between one and five giving up to five TICC's for a PSU

Stratum 3 - select up to four institutions

Stratum 4 - select as many as are needed to give a total of up to ten institutions for the first four strata.

Three options exist for sampling stratum 5; the first one that applies should be used.

(i) if less than ten institutions have been sampled, choose enough to give a sample size of ten

(ii) if stratum 5 contains 16 or fewer institutions, choose one institution

(iii) if stratum 5 contains 17 or more institutions, choose two institutions

All within-stratum sampling should be done by using simple random sampling without replacement. (See Cochran 1977, Chapter 2). Variation on the proposed stratification procedure may be easily employed; however, the distinctions between TICC, secondary, and unclassifiable should be maintained (unless it is possible to eliminate stratum 5) and the within-stratum samples should be approximately evenly split between TICC's and secondaries. The stratification described above should yield adequate sample sizes for the seven programs tentatively examined. Less frequently occurring programs may need special attention.

Once the sample institutions have been selected, data should be collected for all programs at each sample institution according to the assumption discussed at the beginning

of this chapter. The above sampling procedure would (barring non-response) yield data from approximately 300 institutions from 30 different zip code regions.

Size of the institution was not explicitly considered in this plan because small and large institutions (above and below 600 enrollment) appear to occur with equal frequency, (3017 small, 2942 large). It is expected that the sample will be fairly evenly divided between small and large institutions without further explicitly considering the variable.

4.5.1.3 Estimation Procedures

This section describes the procedures used to estimate the population total, Y, of a single variable for a single program in one census region. The estimated total for the entire U.S. is obtained by adding together the estimates for the four census regions. The estimated variance for the entire U.S. is obtained by adding the estimated variances for the four census regions. The following notations and definitions will be used:

R = number of zip code regions (PSU's) in the census region

r = number of sample PSU's from the census region

N = number of institutions in the region

$N = \sum_{i=1}^{R} N_i$, with N_i the number of institutions in the $_i{}^{th}$ PSU

L = number of within-PSU strata used for this region (L=5 in the previous section)

N_{ij} = number of institutions in stratum j of PSU_i

n_i = number of sample institutions in PSU_i

n_{ij} = number of sample institutions in stratum j of PSU_i

M_i, M_{ij}, m_i, m_{ij} are defined like the N's and n's except they give the number of institutions that have the program of interest. (The M's and m's will change for each program, but the N's and n's will not.)

$(Y_{ijk}: i=1, .., R; j=1, ..., L; k=1, .., m_{ij})$ are the sample data for the program.

Estimating the population total involves two distinct steps:

1) using the data from a zip code region (PSU) to estimate the total for that PSU

2) taking a weighted sum across all zip code regions (sample PSU's) to obtain an estimate for the census region

Let $\hat{Y}_i$ be the estimated total for PSU_i. Two methods might be used for finding $\hat{Y}_{ij}$; we recommend the more accurate method which can be used only if the M_{ij} are known. However, in general, $\hat{Y}_i = \sum_{j=1}^{L} \hat{Y}_{ij}$ where:

$$\hat{Y}_{ij} = \frac{M_{ij}}{m_{ij}} \sum_{k=1}^{m_{ij}} Y_{ijk}, \text{ or } \hat{Y}_{ij} = \frac{N_{ij}}{n_{ij}} \sum_{k=1}^{m_{ij}} Y_{ijk} \quad (1)$$

depending on whether M_{ij} is known. Once the $\hat{Y}_i$ are known, the estimated total for the census region is:

$$\hat{Y} = \frac{N}{r} \sum_{i=1}^{r} \frac{\hat{Y}_i}{N_i} \quad (2)$$

which is the commonly used Horvitz-Thompson estimator for unequal probability samples (see Cochran).

Estimating the variance of $\hat{Y}$ also involves two steps as between and within PSU sources of variability must be considered. Both estimates will involve some approximations that tend to yield conservative estimators. The estimated variance is:

$$\hat{V}(\hat{Y}) = \hat{V}_W(\hat{Y}) + \hat{V}_B(\hat{Y}). \quad (3)$$

The within-component is:

$$\mathcal{V}_W(\hat{Y}) = \frac{N}{r} \sum_{i=1}^{r} \frac{\mathcal{V}(\hat{Y}_i)}{N_i}. \tag{4}$$

Note that:

$$\mathcal{V}(\hat{Y}_i) = \sum_{j=1}^{L} \mathcal{V}(\hat{Y}_{ij}) \tag{5}$$

with:

$$\mathcal{V}(\hat{Y}_{ij}) = \frac{M_{ij}(M_{ij}-m_{ij})}{m_{ij}} \hat{S}_{ij}^2 \tag{6}$$

for M_{ij} known, or:

$$\mathcal{V}(\hat{Y}_{ij}) = \frac{N_{ij}(N_{ij}-n_{ij})}{n_{ij}} \tilde{S}_{ij}^2 \tag{7}$$

for M_{ij} unknown. Note that:

$$\hat{S}_{ij}^2 = \frac{1}{m_{ij}-1} \sum_{k=1}^{m_{ij}} (Y_{ijk}-\bar{Y}_{ij})^2 \tag{8}$$

and:

$$\tilde{S}_{ij}^2 = \frac{1}{n_{ij}-1} \left[\sum_{k=1}^{m_{ij}} Y_{ijk}^2 - \frac{(m_{ij}\bar{Y}_{ij})^2}{n_{ij}} \right] \tag{9}$$

if $m_{ij} \geq 2$ for (8) and $n_{ij} \geq 2$ for (9). If $m_{ij} = 0$ for any stratum, it will be dropped from the calculations. If $m_{ij} = 1$ with $M_{ij} > 1$ in (8) or $n_{ij} = 1$ with $N_{ij} > 1$ in (9), it will be necessary to obtain approximations for $\hat{S}_{ij}^2$ or $\tilde{S}_{ij}^2$ by merging data from similar strata and using (8) or (9) with the merged data. Cochran (1977) in sections 2.13, 5A.14, and 11.6 contains most of the background for the variance estimation.

The estimator for the between PSU portion of the variance is taken from Hartley and Rao (1962). This estimator

will tend to be conservative as it is based on the assumption that the PSU's were randomly ordered before choosing the systematic sample. The expression is:

$$v_B(\hat{Y}) = \frac{1}{r-1} \sum_{i<j}^{r} \sum^{r} \left[1-(\pi_i + \pi_j) + \frac{\sum_{j=1}^{R} \pi_j^2}{r} \right] \left(\frac{\hat{Y}_i}{\pi_i} - \frac{\hat{Y}_j}{\pi_j} \right)^2 \quad (10)$$

with:

$$\pi_j = r \frac{N_i}{N} \text{ for } j=1,\cdots,R. \quad (11)$$

Combining (10) and (4) gives $v(\hat{Y})$. Then $\hat{Y} \pm 2\sqrt{v(Y)}$ may be cautiously interpreted as 95% confidence interval for the population total.

4.5.1.4 Sample Size Considerations

Without knowledge of population variances and the effects of stratification and clustering, it is impossible to make definite sample size recommendations. The design outlined here should include approximately 300 institutions taken from 30 zip code locations. It should also yield at least 75 institutions and up to 150 institutions containing each of the 7 programs considered previously.

Thus, reasonably accurate national estimates of cost for the programs should be possible with this sample. Estimates by institution size, type, community size, etc. should be attempted only for the most frequently occurring programs. Assuming that this plan is as efficient as a simple random sample (it is probably less efficient) of institutions, the relative error in an estimator $\hat{Y}$ is given by its coefficient of variation:

$$CV(\hat{Y}) = \frac{\sqrt{V(\hat{Y})}}{E(\hat{Y})} = \frac{CV(Y)}{\sqrt{n}} \quad (12)$$

where:

$$CV(Y) = \frac{\sqrt{\sigma_y^2}}{\bar{Y}} \qquad (13)$$

with σ_y^2 being the variance of the variable Y for all institutions in the country and $\bar{Y}$ is the average for all institutions and n is the number of institutions involved in a particular estimate. For an actual nationwide survey, it appears reasonable to assume CV (Y) will range from at least .1, e.g., mean = \$1000, σ = 100 to .8, e.g., mean = \$500, σ = 400 or even more. Table 4.17 gives some (probably optimistic) estimates of CV ($\hat{Y}$) for various values for n and CV (Y).

Table 4.17

ILLUSTRATIVE ESTIMATES OF SAMPLE ERRORS FOR GIVEN VALUE OF CV ($\hat{Y}$) x 100 AND SAMPLE SIZE FOR SECONDARY-TICC INSTITUTIONS

No. of Inst.	CV (Y)						
	.1	.2	.3	.5	1.0	1.5	2.0
30	2%	4%	5%	9%	18%	27%	27%
50	1.4%	3%	4%	7%	14%	21%	28%
75	1.1%	2%	3%	6%	12%	17%	23%
150	.8%	1.6%	2%	4%	8%	12%	16%
250	.6%	1.3%	1.9%	3%	6%	9%	13%

An example may illustrate how Table 4.17 can be used. If a particular program has a population cost figure of \$1000 per pupil and the population standard deviation is \$200, a CV (Y) = .2 is indicated. If an attempt is made to estimate the \$1000 parameter based on a sample size of 50, the estimate

has approximately a 2 to 1 chance (p = .67) of being within 3% of the parameter, or between $970 and $1030.

These estimates paint a rather bleak picture of the worth of any estimates based on small sample groups. Due to the effect of clustering it is possible that the values in Table 4.17 should be increased by as much as 50%.

If any changes are made in the sampling plan as described, they should be to increase the sample size, either by sampling more locations, or sampling more institutions within locations. The plan described here makes it easy to increase the number of locations by ten at a time, or to increase the number of institutions within locations by five at a time. Statistical considerations lead to increasing the number of locations, but cost considerations may lead to increase the number of institutions within locations.

Almost surely the estimates $v(\hat{Y})$ or $V(\hat{Y})$ will have higher relative error than the actual estimates $\hat{Y}$. As a result, confidence intervals and tests of significane, if applied, should be interpreted quite cautiously.

4.5.2 Sampling Procedure for Four-Year Institutions

Given the relatively small number of four-year institutions, when compared to secondary-TICC institutions, one possible alternative is to disregard the four-year institutions altogether. This could be especially advisable given the relatively large proportion of the four-year institutions with few programs. Also it was noted in an earlier section that a relatively large number of the programs (which are in actuality general program areas) exist in only a small proportion of the institutions. A possible compromise might be to focus on only a few programs.

Assuming that a sample will be drawn for four-year institutions, it is recommended that a sample be selected in the following manner. For each primary sampling unit selected for the secondary-TICC institutions (in a preceding section, this was suggested to be 30 PSU's distributed across the 4 census regions and stratified by size in each region), select a number of four-year institutions proportional to the number of four-year institutions in that PSU. This would be designed to yield a total sample size of approximately 60 four-year institutions with the number in each PSU ranging from approximately zero through four. If it is desired to represent small and large four-year institutions, the selection within each PSU could be further categorized by small (less than 5,000) or large (equal to or greater than 5,000), based on the approximate median enrollment of the four-year institutions. A sample of four-year institutions selected in this matter would permit the use of the same estimation procedures as described for the secondary-TICC institutions.

Since the PSU's are selected randomly within community size categories in each region, the designation of four-year institutions by this process would be essentially random (ignoring the probabilities assigned PSU's in the population) within the same community size categories. This would result in the selection of approximately 60 of the 259 four-year institutions in the population. This number, of course, could be arbitrarily made larger or smaller. Since it constitutes approximately one-fourth of the population, the odds would be approximately seven to one that at least one institution with a "key" program would appear in the sample if the program is present in at least ten of the

population institutions. For a program that exists in 20 of the 259 institutions, the odds would be slightly greater than even that at least four of the sample institutions would contain the program. Therefore, this process would tend to generate an adequate sample of the more common programs.

Since this sample is taken from a relatively small population, it is reasonable to apply a correction for sampling from finite populations (Schlaifer, 1961, p. 259). Assuming that the sample consists of approximately 23% of the population, the finite correction factor for any estimate of the standard deviation would be approximately .88. For programs which appear in a relatively large number of institutions, this would appear to be a reasonable expectation. However, for programs that appear in a smaller number of institutions, for example 20, the correction factor would fluctuate since the number of institutions in the sample with a particular program can fluctuate more widely. This can be taken advantage of, however, to reduce the estimate of variation. For example, if a program appears in only 20 institutions, it would be expected to appear in approximately four or five of the 60 sample institutions, resulting in finite correction factors of .92 and .89 respectively. If only two of the sample institutions contain the program, the finite correction factor would only be .97.

Table 4.18 has been developed to indicate likely sampling errors based on random sampling and assumed population standard deviations of $100, $200, and $400. As mentioned earlier, no reliable information is available on the standard deviations or variances for either the four-year institutions or the secondary-TICC institutions. Based on the rough information available

Table 4.18

ILLUSTRATIVE ESTIMATES OF SAMPLING ERRORS FOR 4-YEAR INSTITUTIONS

Sample Size	Institutions with Program		Finite Correction Factor	Illustrative Population Standard Deviations		
	Population	Sample		$100	$200	$400
60	20	2	.97	$ 69	$138	$275
		5	.89	40	79	159
		7	.83	31	63	125
	50	8	.93	33	65	131
		12	.88	25	51	102
		16	.83	21	42	83
	100	17	.92	22	44	89
		23	.88	18	37	74
		28	.85	16	32	64
90	20	5	.89	40	79	159
		7	.83	31	63	125
		10	.73	23	46	92
	50	15	.85	22	44	87
		17	.82	20	40	80
		22	.76	16	32	64
	100	33	.82	14	29	57
		35	.81	14	27	55
		42	.77	12	24	47

in the Florida studies and the pilot studies conducted by EMS, the "guesstimates" of $100-$400 seem likely for most programs. Table 4.18 also describes likely results for two sample sizes -- a sample of 60 as recommended above or a possible larger sample of 90. The table further breaks down the likely results by the number of four-year institutions in the population of 259 that actually have a particular program. For illustrative purposes these were chosen to be 20, 50, and 100. Finally, based on the number of institutions in the population with a program and the actual sample size selected, estimates were made of the number of institutions in the sample that might have the program of interest. These three estimates, indicated under the column entitled Institutions with Program - Sample,

constitute the most likely value bounded by approximately the first and third quartiles. For example, if a sample of 60 institutions is selected from the 259 in the population, and one is concerned with a program which appears in 100 of the 259 institutions, it is most likely that a sample will be obtained with 23 institutions exhibiting the program. The odds are approximately even that the sample of 60 will contain at least 17 and not more than 28 institutions with the program of interest.

The dollar figures under the columns labeled Illustrative Population Standard Deviations - $100 - $200 - $400, may be interpreted as standard errors of the obtained sample mean. Multiplying these by two would give an approximately 95% confidence interval. For example, if one is interested in a program that appears in 100 of the 259 institutions and a sample of 60 is selected, it could be expected that the program would be found in approximately 23 of the 60 institutions. If this happens, and the true population standard deviation is $200, then the standard error of the mean could be considered $37. If only 17 of the 60 institutions exhibit the program, the standard error would be approximately $44. It should be remembered that these estimates are based on given population standard deviations. In the real situation, these standard deviations are not known and they would, in turn, be estimated by the sample. The resulting standard errors and confidence intervals would, in general, be larger. The magnitude of these errors may be illustrated as follows: Assuming a program that is known to exist in 100 of the institutions and that in a sample size of 60 a sample mean of $1000 is obtained, a 95% confidence interval is likely

to extend from $912 to $1088 if the population standard deviation is approximately 200.

Examination of Table 4.18 shows, as expected, that the precision increases with the sample size and also with the more common programs.

REFERENCES

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V. DATA COLLECTION FORMS AND PROCEDURES

5.1 INTRODUCTION

Documentation for the differential cost model prepared by IEF contained several forms for data collection. To the extent possible, EMS used these forms and procedures. Modifications/additions were made as needed. Eight forms are used to facilitate the data collection process. Five forms are designed to retrieve all vocational program and basic education program costs, and three forms are designed to calculate the costs for special education/special needs, compensatory education, and adult/continuing education for purposes of deducting these costs from the basic program costs.

All forms were designed to be used with any of the four proposed data collection strategies although, as noted in a previous chapter, only three strategies were tested. At some sites, however, because of the capability of the institution's accounting system, it was not necessary to employ all the forms and procedures, especially the forms used for deducting special education and compensatory education costs. Thus, in cases where the institution already had these deductible costs isolated from basic program costs, it was only necessary to use one form to record basic program costs. Similarly, some institutions did not need to use all the vocational forms provided since they employed program accounting and could readily transfer their costs to the summary data form. A further discussion of the data collection forms is presented in Section 5.3.

5.2 LEA ORIENTATION MATERIALS

The three data collection strategies actually tested by EMS required the orientation of LEA personnel to the conceptual framework of the model and especially to the data collection requirements. As discussed in Section 3.4 the methods used for orientation of LEA personnel varied with the data collection strategy used. For each of these models, however, the same basic set of orientation materials were used. These materials along with an example of each type of form were assembled in a User's Handbook which was given to each LEA participant. While no formal transcript of the orientation session was made, the following sections serve to highlight some of the materials used and attempt to capture some of the general concepts presented during these discussions.

Exhibit 5.1 was used to convey the concept of how basic education costs are determined in a LEA (assuming the LEA has both vocational and basic programs). It was explained that given the total operational expenditures of the LEA, by subtracting out the operating expenditures associated with vocational education, special education, compensatory education, and any other unique expenditures which may be confounded in the basic program, the resulting value is the expenditure for basic education programs. It was also explained that the student and staff accounting functions followed along the same concepts.

To explain the way in which costs are allocated with the vocational area, Exhibit 5.2 was used. This discussion assumed an organizational structure of the LEA in which each organizational level of the LEA produced a cost allocation to all subordinate

EXHIBIT 5.1

TRANSPARENCY USED IN ORIENTATION SESSION TO PRESENT BASIC PROGRAM EXPENDITURES CONCEPT

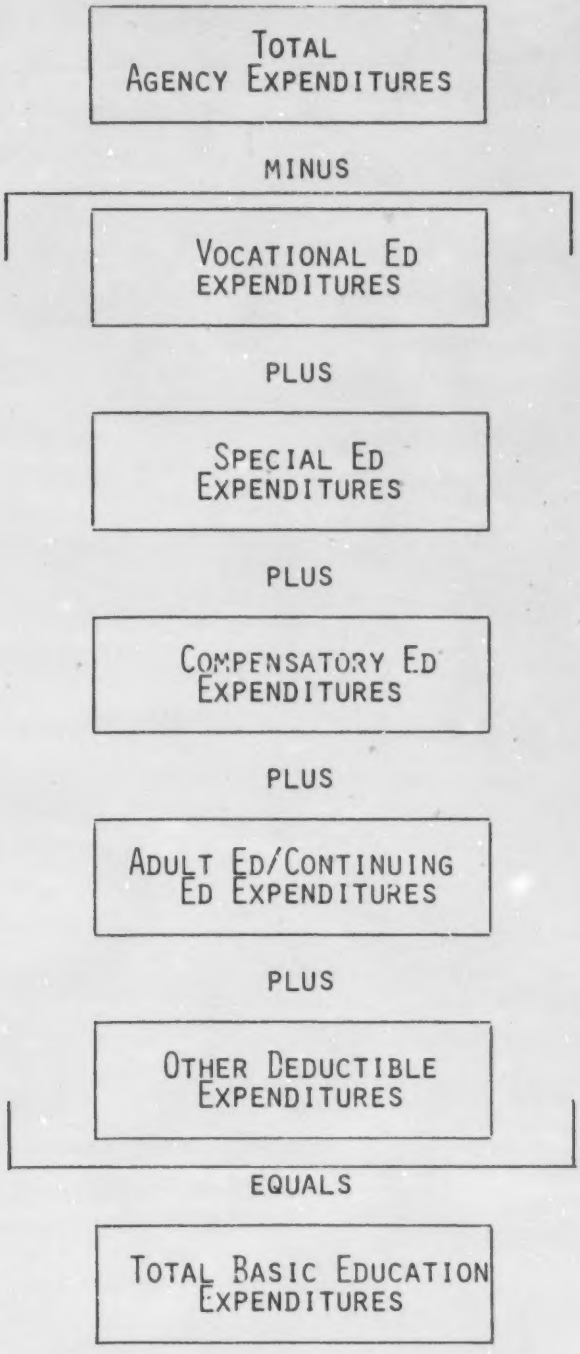
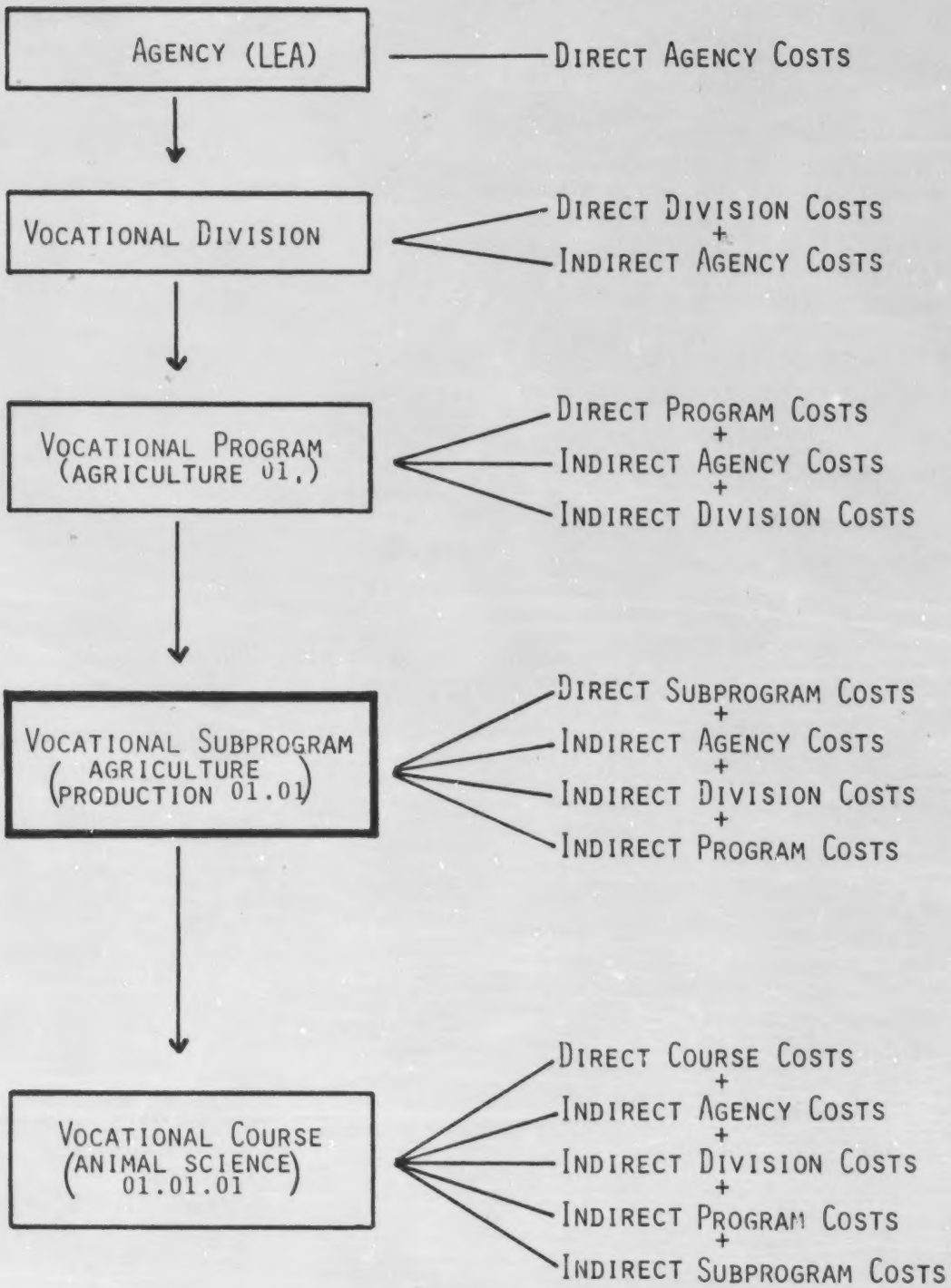


EXHIBIT 5.2

TRANSPARENCY USED IN ORIENTATION SESSION TO PRESENT VOCATIONAL EXPENDITURE ALLOCATION CONCEPT



levels. Thus, if one starts with the agency (LEA), all costs, by definition, are direct. That is, all costs can be identifiable directly to the agency level. At the second level of organization, the vocational division, while certain costs are direct to that division, other costs must be allocated from the agency level (indirect agency costs) as well. Other levels within the division are treated likewise, all the way "down" to the course level, where direct course costs, such as teachers, suppliers, etc., can be identified directly with a given course, with each course also supporting its "fair share" of indirect costs from higher agency levels.

The concepts presented in the previous exhibit were then simulated by an example as outlined in Exhibit 5.3. During this discussion an example of a "simplified" vocational program was used to show a specific case of how direct and indirect cost allocations are made within the model. The example was correlated closely with the actual data collection forms (V/T-1, V/T-2, etc.) to show the sequence of data collection as well. The simulation ended with the comparison of the vocational costs to basic education and the calculation of a cost differential.

Before the entire simulation discussed above could be completed, the deduct system for special education was introduced and discussed. Exhibit 5.4 was used to explain which direct cost data should be collected. At this time, the 5% indirect approximation method was explained (development of the deduct system showed that indirect costs could be estimated with reasonable accuracy using five percent of all direct costs) as well as the method for computing FTE's for the handicapped. In fact, part of the simulation

EXHIBIT 5.3

Simulation Problem Used in Orientation Sessions to Determine Direct and Indirect Vocational Costs

Total Voc. Division Enrollment (FTE's)	200
Total Voc. Division Teachers (FTE's)	10

AGRICULTURAL AREA		Enrollment
Agricultural Production Program	01.01	
Animal Science	01.01.01	20
Plant Science	01.01.02	20
Agricultural Products Program	01.04	
Food Products	01.04.01	20
Non-Food Products	01.04.02	20

V/T-1

STAFF	Salary
Director of Voc. Ed.	40,000
Supervisor of Agriculture	30,000
Dir. of Agricultural Production	20,000
Dir. of Agricultural Products	20,000
Animal Science Teacher	10,000
Plant Science Teacher	10,000
Food Products Teacher	10,000
Non-Food Products Teacher	10,000
Secretary of Agriculture Dept.	7,000

SUPPLIES	
Animal Science	500
Plant Science	1,000
Food Products	1,000
Non-Food Products	500
	3,000

TOTAL DIRECT COSTS FOR AGRICULTURAL PRODUCTION PROGRAM

Supervisor of Agricultural Production	20,000
Teacher Salaries	20,000
Supplies	1,500
	41,500

EXHIBIT 5.3 (CONT.)

V/T-2 OTHER PERSONNEL COSTS

Dir. of Voc. Ed. - Salary Ratio of teachers (2) in Agricultural Production Program to all teachers in Vocational Education (10).	$\frac{2}{10}$ ($40,000)	= $ 8,000
Sup. of Agriculture Ratio of teachers (2) in Agricultural Production Program to number of teachers in Agricultural area (4).	$\frac{2}{4}$ ($30,000)	= $15,000
Secretary of Agricultural Area Ratio of teachers (2) in Agricultural Production Program to number of teachers in Agricultural area (4).	$\frac{2}{4}$ ($ 7,000)	= $ 3,500
	TOTAL	$26,500

V/T-3 OTHER NON-PERSONNEL COSTS

Xerox Machine Rental (Div.) Ratio of Agricultural Production Program students to total number of students.	$\frac{40}{200}$ ($6,000)	= $ 1,200
Paper, Pencil, Etc. (Div.) Ratio of Agricultural Production Program students to total number of students.	$\frac{40}{200}$ ($5,000)	= $ 1,000
	TOTAL	$ 2,200

TOTAL INDIRECT COSTS	$26,500	
	2,200	
	$28,700	

V/T-4 SUMMARY OF COSTS FOR AGRICULTURAL PRODUCTION PROGRAM

Direct Costs	$41,500	
Indirect Area & Division Costs	$28,700	
	= $70,200	(Does not include Agency-Wide Indirect from Non-Instructional accounts.)

EXHIBIT 5.4

Transparency Used in Orientation Sessions to Present Special Education Deduct Concept

DIRECT EXPENDITURES*

- ALL SALARIES, E.G. PROFESSIONAL, PARAPROFESSIONAL, SUPPORT
- FRINGES
- MATERIALS
- OFFICE SUPPLIES
- PROGRAM RESEARCH AND EVALUATION
- IN-SERVICE
- TRAVEL
- FOOD SERVICE
- FEES AND TUITION
- FIXED CHARGES
- OTHER

INDIRECT ALLOCATION

- 5% OF TOTAL SPECIAL ED DIRECT EXPENDITURES

*Prorate salaries of less than full-time staff. Prorate costs shared with other programs.

problem actually required the use of the special education deduct procedure.

In total, twelve different transparencies were available for use during the orientation sessions. Depending upon the audience and the circumstances of the LEA, differing degrees of emphasis were given to various concepts and to the simulation exercises.

5.3 LEA DATA COLLECTION FORMS

This section of the report presents the data collection forms along with a discussion of the rationale behind each form and a detailed description for using the form. To the extent appropriate both the forms and terminology follow the documentation by IEF.

5.3.1 V/T-1 Vocational-Technical Direct Course Costs

The purpose of the V/T-1 form displayed in Exhibit 5.5 is to capture the known direct costs for each vocational course within each subprogram. Depending upon the existing student and financial accounting systems of the LEA, several of the data elements required for this form may be obtained from existing LEA documentation.

For example, instructor salary may be input from the payroll distribution record, while items 1, 2, 3, 4, and 5 may be derived from the student accounting records. The original forms and procedures were designed to be independent of any single manual or automated accounting systems. Thus, form V/T-1 was designed to capture basic data elements which may be available through many existing LEA systems. For those situations data collection could commence with the form and procedures appropriate to the situation. However, the

EXHIBIT 5.5

V/T-1 - Form Used to Collect Vocational-Technical Direct Course Costs

SUBPROGRAM [12] _____

[1] COURSE NUMBER	[2] INSTR NUMBER	[3] INSTRUCTOR NAME LAST	FI	MI	[4] INSTR LOAD	[5] FTE STUDENTS	[6] SALARY	[7] BENEFITS	[8] PURCHASED SERVICES	[9] MATERIALS & SUPPLIES	[10] OTHER	[11] CAPITAL OUTLAY	[12] PART/ PROJECT
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instructions that follow assume original data input.

Direct costs categories are those established in U.S.O.E. Handbook II Revised. LEA and/or state accounting systems may be adapted for purposes of distributing expenditure objects. All expenditure balances not known to be directly related to specific course offerings can be captured on V/T-3 and then prorated to courses on an FTE basis.

The program area coordinator or other supervisor should prepare a V/T-1 for each program. Subprogram code and title should be identified according to the Handbook VI classifications (e.g., 01.01 - Agricultural Production). Data for all items may be obtained from central administration records and/or individual program instructors or supervisors.

The amounts entered as expenditures by object for all courses, the other personnel program costs (V/T-2), and the unassigned program costs (V/T-3) sum to equal the total expenditures for vocational-technical education. It is important to associate as much of the direct course cost as possible to the appropriate instructional offering since prorating of the residual costs identified on V/T-3 tends to "average" costs; perhaps inappropriately. For example, welding rods often amount to a large expenditure and should be attributed directly to the course rather than averaged over all courses in the program area.

DETAILED INSTRUCTIONS FOR COMPLETING V/T-1

Item Number	Item Name	Description
01	Course Number	Enter the designated O.E. eight-digit number for the course beginning with

Item Number	Item Name	Description
		the program area and annexing zeros where appropriate (e.g., 04.011000).
02	Instructor Number	Enter the instructor's employee number used by the state and/or local educational agency for payroll purposes.
03	Instructor Name	Enter the instructor's last name, first name, and middle initial. If the course is taught by more than one instructor, enter necessary data for each.
04	Instructor Load	Enter the assigned annual duty load given the instructor for each course. The full-time equivalent annual load must be used to compute the duty load assigned.

Example 1: A full-time equivalent instructor teaches 5 hours per day for 180 days. The course under consideration meets 1.0 hour per day for 180 days. The instructor load for that course would be determined as follows:

$$\left(\frac{1.0 \times 180}{5 \times 180}\right) = \left(0.20\right) .$$

Example 2: A full-time equivalent instructor teaches 15 hours per week for the annual term of 36 weeks. The course meets 3 hours per week for 18 weeks. The instructor load for that course would be determined as follows:

$$\left(\frac{3 \times 18}{15 \times 36}\right) = \left(0.10\right) .$$

Example 3: A part-time teacher is assigned a course or a regular teacher is paid on overload supplement for the course. If it is the only assignment, use the ratio of the amount paid for the course being considered to the average salary of teachers in the instruction area:

$$\left(\frac{\$\ 1{,}000 \text{ paid for course}}{\$10{,}000 \text{ avg. voc. teacher's salary}}\right) = \left(0.10\right)$$

Item Number	Item Name	Description
		- or -
		$\left(\frac{\$\ 1{,}000 \text{ paid for overload supplement}}{\$10{,}000 \text{ avg. voc. teacher's salary}}\right) = \left(0.10\right)$
05	FTE Students	Enter the full-time equivalent students enrolled in each course. If student contact hours (SCH) data are available, then the FTE students for the course are determined by: $\frac{\text{Sum of SCH}}{\text{Number of SCH/FTE*}}$ Use the same computation if average daily membership (ADM) is computed instead of enrollment. If average daily attendance is used for pupil accounting, convert to ADM and use the above method to obtain FTE. *The numerator of this ratio is the total number of student contact hours of instruction given during the duration of the course. For example, if 15 students meet three hours per day for 180 days, the total number of SCH would be 8100 [15x3x180]. The denominator of the ratio is the number of SCH normally associated with a FTE student and is determined by LEA policy. For example, if LEA policy requires a full-time student to complete 900 SCH, then this figure (900) would be used. Thus in the above example 9 FTE students would be counted for this course. $\left(\frac{8100}{900}\right)$
06	Salary	Enter the portion of the salary of the instructor associated with each course. For example, if the annual contract salary is $10,000 and the instructor load for the course is 0.20, then determine the amount as follows: (.20 x $10,000 = $2,000). Be sure that all of a part-time instructor's payment is included; or, the overload supplement of a regular

Item Number	Item Name	Description
		teacher. It is recommended that full-time and part-time teachers be placed on separate forms and thereby facilitate the computations.
07	Benefits	Employee benefits for direct salaries are calculated based on either an average of benefits paid all agency personnel or through direct input. Method 1 $\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\text{Instructor's salary}\right)$ Where data exist, it is preferable to use the ratio of total benefits paid for instructional personnel to total salaries paid for instructional personnel. Method 2 Multiply social security rate (state retirement rate) plus other standard rates (e.g., worker's compensation) times the portion of salary that applies and add dollar value of hospitalization insurance and other benefit costs.
08	Purchased Services	Enter the dollar value of purchased services associated with each course. The instructor is the best resource person for these data if the accounting system in use does not associate purchases with courses.
09	Materials and Supplies	Enter the dollar value of materials and supplies associated with each course. The instructor is the best resource person for these data if the accounting system in use does not associate purchases with courses.
10	Other	Enter the dollar value of other expenditures (e.g., dues and fees) associated with each course.
11	Capital	Enter the dollar value of capital outlay items (replacement and/or new

Item Number	Item Name	Description
		equipment) purchased during the current year that are associated with each course.
12	Subprogram	Enter the subprogram code and title (e.g., 01.01 Agricultural Production). This study determined differential costs at the subprogram level. If costs were aggregated to the program level (as was done by IEF) the same form and procedures would be used. The model is adaptive to different levels of aggregation, however, the person collecting the data must remain cognizant of the level of aggregation to maintain consistency among and between data elements collected.
13	Part/ Project	Enter the PART and/or PROJECT numbers associated with each course that is supported by special state/federal funds. Two six-digit fields have been established for this purpose. (See original IEF documentation.)
XX		(54 spaces remain for additional state/ local information. (See original IEF documentation.)

5.3.2 V/T-2 Vocational-Technical Other Personnel Program Costs

The general purpose of form V/T-2, shown in Exhibit 5.6, is to capture costs of all "other" personnel associated with Vocational Education. Administrative, clerical, and other personnel serving a division, or program, should have their salaries and benefits assigned proportionately based on the division of their time and responsibilities. It is assumed that all personnel that have assignments (even if the assignment is only part-time) at the subprogram level will be identified by V/T-1. Thus, the personnel costs identified by V/T-2 are indirect costs associated with the program and division levels and need to be "prorated back" to the appropriate

EXHIBIT 5.6

V/T-2 - Form Used to Collect Vocational-Technical Other Personnel Full/Part-Time Costs

1 EMPLOYEE NUMBER	2 EMPLOYEE NAME LAST	FIRST	MI	3 POSITION TITLE	4 SALARY	5 BENEFITS	6 ASSIGNMENT CLASSIFICATION
							•
							•
							•
							•
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							•
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subprogram. Employees should be assigned on the basis of the numerical classification system in Handbook VI. Provision is made to prorate these costs according to specific assignments or across all program areas. The Director of Vocational Education should be responsible for distribution of these "other" personnel costs. As a "double check" all personnel related costs associated with the operation of vocational education at the division level or below, should be accounted for on V/T-1 and V/T-2.

DETAILED INSTRUCTIONS FOR COMPLETING V/T-2

Item Number	Item Name	Description
01	Employee Number	Enter the employment number used by the state and/or local educational agency for payroll purposes.
02	Employee Name	Enter the employee's last name, first name, and middle initial.
03	Position Title	Enter position title, e.g., Director of Vocational Education, File Clerk, Supervisor of Agricultural Production.
04	Salary	Enter the annual salary of each employee paid through the Vocational Division.
05	Benefits	Employee benefits are calculated either on an average of benefits paid all agency personnel or through direct input.

Method 1

$$\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\text{Employee salary}\right)$$

Method 2

Multiply social security (state/local retirement) plus other standard rates (e.g., worker's compensation) times the employee's salary subject to

Item Number	Item Name	Description
		those rates and add dollar values for hospitalization and other benefit costs.
06	Assignment Classification	Enter the Vocational Education designator for the subprogram. If the employee serves all subprograms within a program area, enter the code number of the program. If the employee serves all programs, write the word "All" in this column. Expenditures for personnel who serve in more than one subprogram will need to be prorated. This can be done by techniques suggested later (see V/T-3) or it can be done at this time based upon knowledge about how the personnel actually spend their time. These are some of the subjective judgements which must be made during the data collection process. The following example may help to illustrate this situation.

Position Title	Assignment Classification
#1 Director of Voc. Ed.	All
#2 Supervisor of Agri. Prod.	01.01
#3 Director of Agriculture	01.01 & 01.04
#4 File Clerk	01.00 & 17.00

For person #1, the salary and benefits of the Director of Vocational Education will be assigned across all Vocational subprograms on V/T-2. This is done on the basis suggested by V/T-4. For person #2, the salary and benefits of the Supervisor of Agricultural Production will be assigned to the 01.01 subprogram area only. For #3 and #4, if the duties of the Director of Agriculture are divided between two programs, the entry will show each program designator, e.g., 01.01 agricultural production and 01.04 agricultural products. In example #4, if a file clerk serves both the Agriculture and Trades and Industry areas, the entries would indicate each area, e.g.,

Item Number	Item Name	Description
		01. Agriculture and 17. Trades and Industry, and would be prorated on some percentage (50-50; 25-75, etc.).

5.3.3 V/T-3 Vocational-Technical Other Non-Personnel Costs

Exhibit 5.7 presents form V/T-3. The purpose of this form is to distribute, where possible, all remaining vocational education costs to subprograms. V/T-3 is a parallel form to V/T-2. Its purpose, like V/T-2, is to capture costs which could not be assigned directly to a subprogram level on V/T-1. Thus V/T-3 identifies the program and division indirect expenditures which must then be "prorated back" to the subprogram by an appropriate means. As a "double check" all non-personnel operational expenditures associated with vocational education in the LEA should be accounted for on V/T-1 and V/T-3. Thus the combination of V/T-1, V/T-2, and V/T-3 identifies all expenditures for the LEA which can be associated with vocational education. The designations of "Instructional" and "Administrative and Other Support" are made for purposes of proration. Other non-personnel instructional expenditures which are non-assignable at the subprogram level, will be prorated back to subprograms on a FTE student basis while Administrative and Other Support expenditures will be prorated back to subprograms and on a FTE instructor basis. Those expenditures which can only be associated with the division level should be assigned as "All" and then will later be prorated back to the subprogram level also. Items which might be entered on this form are those which are not

EXHIBIT 5.7

V/T-3 - Form Used to Collect Vocational-Technical Other Non-Personnel Costs

DESCRIPTION	INSTRUCTIONAL			ADMINISTRATIVE & OTHER SUPPORT			7 CAPITAL OUTLAY	8 HOW ASSIGNED
	1 PURCHASED SERVICES	2 MATERIALS & SUPPLIES	3 OTHER	4 PURCHASED SERVICES	5 MATERIALS & SUPPLIES	6 OTHER		
								•
								•
								•
								•
								•
								•
								•
								•
TOTALS								

directly attributable to a subprogram, such as rental of a Xerox machine, consumable supplies available for use by part or all of the Vocational Division, etc.

DETAILED INSTRUCTIONS FOR COMPLETING V/T-3

Item Number	Item Name	Description
01	Purchased Services	Enter the dollar value of instructional related purchased services known to be associated with each program.
02	Materials and Supplies	Enter the dollar value of instructional related materials and supplies known to be associated with each program.
03	Other	Enter the dollar value of instructional related unclassified or other expenditures (e.g., dues and fees) known to be associated with each program.
04	Purchased Services	Enter the dollar value of administrative and other support purchased services known to be associated with each program.
05	Materials and Supplies	Enter the dollar value of administrative and other support materials and supplies known to be associated with each program.
06	Other	Enter the dollar value of administrative and other support "other" (e.g., dues and fees) expenditures known to be associated with each program.
07	Capital Outlay	Enter the dollar value of capital outlay items (equipment, etc.) purchased during the current year that are associated with each program.
08	How Assigned	Enter the appropriate program to which the costs are assigned. If the expenditure is for services/ supplies provided for use by the entire division, write "All" in this column. The following examples will help to illustrate the situation.

Item Number	Item Name	Description	
		Description	How Assigned
		#1 Xerox rental	All
		#2 Fertilizer & Seed	01.00
		In example #1, the rental cost of a Xerox machine provided for the entire Vocational Division would be assigned across all subprograms. Since the type of machine would probably be considered administrative, it would be prorated back to subprograms on the portion of FTE teachers in each subprogram. In example #2, fertilizer and seed costs would be related to the Agriculture program (01.00). This expense should have probably been identified on V/T-1 and assigned to Agriculture Production (01.01). If these costs are really associated with agriculture production, the assignment should be made directly to 01.01, otherwise the cost should be prorated to all or part of the remaining agriculture subprogram.	

5.3.4 V/T-4 Vocational-Technical Program Costs - Summary Data Worksheet

The major purposes of the V/T-4 form shown in Exhibit 5.8 are to establish the total vocational subprogram expenditures and thereby facilitate the determination of the "basic" program expenditures and to establish the cost indices for all programs and for the total vocational program.

Completion of the lower half of V/T-4, Program Costs/Student, is contingent upon completion of the upper half of that form and the completion of form B-1 which is presented in Section 5.3.8.

EXHIBIT 5.8

V/T-4 - Form Used to Collect Vocational-Technical Subprogram Costs

SUMMARY DATA WORKSHEET

1 SUBPROGRAM	DIRECT COSTS V/T-1					OTHER V/T-2		NON-PERSONNEL PROGRAM COSTS V/T-3							
								INSTRUCTIONAL			ADMINISTRATIVE/OTHER				
	2 SALARIES	3 BENEFITS	4 PURCHASED SERVICES	5 MATERIALS & SUPPLIES	6 OTHER	7 SALARIES	8 BENEFITS	9 PURCHASED SERVICES	10 MATERIALS & SUPPLIES	11 OTHER	12 PURCHASED SERVICES	13 MATERIALS & SUPPLIES	14 OTHER	15 TOTALS	16 CAPITAL OUTLAY (V/T-3)
															(V/T-1)
TOTALS															

SUBPROGRAM COSTS/STUDENT

SUMMARY DATA WORKSHEET

20 SUBPROGRAM	21 FTE TEACHERS (V/T-1)	22 FTE STUDENTS (V/T-1)	23 TOTAL DIRECT COSTS (item #15 above)	24 TOTAL INDIRECT COSTS/STUDENT	25 TOTAL INDIRECT COSTS/TEACHER	26 TOTAL COSTS	27 COSTS/FTE	28 COST INDEX	29 CAPITAL COSTS PER STUDENT
TOTALS									

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DETAILED INSTRUCTIONS FOR COMPLETING V/T-4

Item Number	Item Name	Description
01	Subprogram	Names and codes of subprograms.
02-06		These data elements are similarly named on forms V/T-1, V/T-2, and V/T-3. Transfer the values to the appropriate column.
07		Prorate salaries of other personnel listed on V/T-2 to the appropriate subprogram designation, e.g., 01.01, according to the number of FTE teachers in that program. For example, if the Director of Vocational Education is responsible for 20 teachers in the Vocational Division and two of these teachers are in the Agricultural program, then 1/10th of his/her salary would be allocated to the 01.01 subprogram.
08		Prorate benefits in the same manner as salaries described in 07 above.
09-10-11		If services, supplies, etc. are shared by several programs, prorate the total costs based on number of FTE students in the subprograms. For example, if $1,500 of supplies are shared by 20 students in Agricultural Production and 10 students in Agricultural Mechanics, the allocation to Agricultural Production would be 2/3 of $2,000 or $1,333.
12-13-14		Follow procedures as described in the previous step but prorate on the basis of the portion of FTE teachers in the subprogram rather than upon FTE students.
15	Totals	Enter sums of items 02-14 for each subprogram. Sum all columns. Transfer audited sum of item #15 to item #13, form B-1.
16	Capital Outlay	Transfer values from forms V/T-1 and V/T-3.

Item Number	Item Name	Description
17-19		Items not included on the form.
20	Subprogram	Names and codes of subprograms.
21	FTE Teachers	Enter sum of item #4, instructor load, form V/T-1.
22	FTE Students	Enter sum of item #5, V/T-1.
23	Total Direct Costs	Enter item #15, above, for each subprogram.
24	Total Indirect Costs/ Student	Enter the product of item #22 (V/T-4) and item #39 (B-1 secondary) or item #37 (B-1 postsecondary).
25	Total Indirect Costs/ Teacher	Enter the product of item #21 (V/T-4) and item #40 (B-1 secondary) or item #38 (B-1 postsecondary).
26	Total Costs	Enter sums of items #23, #24, and #25 for each subprogram. Sum columns #23-#25.
27	Costs/FTE	Enter the quotient of items #26 divided by item #22 for each subprogram.
28	Cost Index	Enter the quotient of item #27 (V/T-4) divided by item #18 (B-1) for each subprogram.
29	Capital Costs/ Student	Enter the quotient of item #16 divided by item #22 for each subprogram.

5.3.5 Special Education Data Collection Form SP-1

The accompanying Special Education/Special Needs form (SP-1) for the collection of handicapped data presented in Exhibit 5.9 was developed based on the conceptual framework outlines in Chapter II. Refinements were made in previous drafts of the form following discussions with local agency personnel. These discussions were conducted at local agency sites using

EXHIBIT 5.9

SP-1 - Form Used to Collect Special Education and Special Needs/Handicapped Costs

Secondary/Postsecondary Agency

A. SPECIAL EDUCATION DIRECT SALARIES

1. Special Ed Professional Staff Salaries $_____
2. Special Ed Para-Professional Staff Salaries _____
3. Special Ed Support Personnel Salaries _____
4. Fringe Benefits for #1-#3 above (@ %) _____
5. Total Special Education Salaries (sum items #1-#4) $_____

B. SPECIAL EDUCATION DIRECT EXPENDITURES

6. Professional Materials $_____
7. Instructional Materials _____
8. Office Supplies _____
9. Program Evaluation and Research _____
10. In-Service Staff Development _____
11. Field Trips _____
12. Staff Travel _____
13. Food Services _____
14. Service Fees and Tuition _____
15. Fixed Charges _____
16. Special Transportation _____
17. All Other Special Ed Direct _____
18. Total Special Education Direct (sum items #6-#17) $_____

C. STUDENT/STAFF DATA

19. Special Education Full-Time Enrollment _____
20. Special Education FTE Teachers _____

D. SPECIAL EDUCATION COST SUMMARY

21. Special Education Salaries (item #5 above) $_____
22. Special Ed Direct Expenditures (item #18 above) _____
23a. Total Special Education Expenditures (sum of items #21 and #22 above): $_____
b. Special Education Indirect Allocation (item #23a x 5%) _____
24. Total Special Education Deduct (sum items #21-#23) $_____

E. SPECIAL NEEDS/HANDICAPPED DIRECT SALARIES - VOC. PROG.

25. Special Needs Professional Staff Salaries $_____
26. Special Needs Support Personnel Salaries _____
27. Fringe Benefits for #25 and #26 above (@ %) _____
28. Total Special Needs Salaries (sum items #25-#27 above) $_____

F. SPECIAL NEEDS/HANDICAPPED DIRECT EXPENDITURES

29. Materials and Supplies $_____
30. Staff Travel _____
31. Service Fees and Tuition _____
32. Special Needs Transportation _____
33. All Other Special Needs/Handicapped Direct Expenditures _____
34. Total Special Needs/Handicapped Direct (sum items #29-#33) $_____

EXHIBIT 5.9 (CONT.)

G. SPECIAL NEEDS STUDENT/STAFF DATA

35. Special Needs Full-Time Enrollment _____
36. Special Needs FTE Teachers _____

H. SPECIAL NEEDS/HANDICAPPED COST SUMMARY

37. Special Needs Salaries (item #28 above) $_____
38. Special Needs Direct Expenditures (item #34 above) _____
39a. Total Special Needs Expenditures (sum of items #37 and #38 above): $_____
b. Special Needs Indirect Allocation (item #39a x 5%) _____
40. Total Special Needs Deduct (sum items #37-#39) $_____

actual special education expenditure data in a "dry run" of the data collection process. The forms and process were then tested as part of the data collection process at the pilot sites.

The instructions that accompany the form described each item on the form and indicate the type of expenditures to be included in each category. The list of expenditure examples in each category is not exhaustive, but rather suggestive of the type of expenditure to be included. The primary consideration in collecting special education data, of course, is to identify a total for all associated costs, for purpose of deduction, rather than to determine expenditures in specific cost categories.

In order to collect special education cost data, it is of course necessary that the special education population be defined. These definitions were presented in Section 2.2.3.

The definitions provided in that section will not be repeated here. It should be noted, however, that two modifications were proposed for the purposes of this study. These are as follows:

1. Add to P.L. 94-142 and P.L. 94-482 definitions the statement "Categories of handicapped as defined by your state law, but which are not identified by P.L. 94-142 and/or P.L. 94-482, are to be added for purposes of this survey."

2. Add to the list of P.L. 94-482 acceptable recognized handicapping conditions, the words "deaf-blind, multi-handicapped" to make the range of conditions listed more inclusive; add to conform with those identified by P.L. 94-142.

Direct costs associated with Special Education and Support Services provided to students falling within the above

definitions will be accumulated for deduction purposes. This will not include a prorated share of regular/basic education costs for mainstreamed special education students. It is assumed that regular/basic education provided to special education students in basic education will, however, be included in the special education deduction figure. For example, the cost of a reader for a blind student in basic education classes would be included as part of the handicapped deduct.

For purposes of counting the special education student population, only full-time special education students will be included as discussed in Chapter II. Since basic education services and facilities must be maintained for special education students who are mainstreamed but spend less than full time in basic programs, it was assumed that the cost of these programs was substantially unaffected by the portion of time these students spend receiving special education services. Thus, partial handicapped FTE's were not deducted from basic FTE students.

Prorations will be made from a number of Handbook II support service expenditure accounts in order to identify the cost of providing these services to special education students. This will necessarily require that certain judgements be made regarding the amount of cost to be allocated to special education. In general, the approach employed to allocate costs between special education and other areas will be based on use. For example, Handbook II account 2140, Psychological Services, will be prorated between services provided to special education students and others based on the amount of time

spent by psychologists with each type of student. If a determination of time spent is not possible, the proration will be accomplished based on special education student FTE's versus basic FTE's. However, if a disproportionate level of service is accorded either group, a weighting factor should be introduced based on the psychologist's estimate of the amount of additional service provided to handicapped students.

The Handbook II accounts to be treated are the 2100 series, Pupil Support Services accounts. These include 2110, Attendance and Social Work Services; 2120, Guidance Services; 2130, Health Services; 2140, Psychological Services; and 2150, Speech Pathology and Audiology Services.

In the collection of special education cost data, actual expenditure data are preferred over other forms of information. It is anticipated, however, that in at least some cases, expenditure data will be unavailable, or will be unavailable in usable form. In such cases, Special Education budget figures should be substituted. Budget figures are presumed to be close enough approximations of expenditure figures for deduction purposes. As indicated in Chapter II, even in a LEA where the special education expenditure, if analyzed in finite detail, was ten percent of total district expenditures, a twenty percent error in determining costs of special education would result in only a two percent error in determining basic education costs.

An allocation of agency indirect costs should be made to special education at the rate of five percent of total special education direct expenditures. This approach was used

in lieu of a determination of actual agency indirect costs with assignment to special education on a calculated proration basis. Due to the time and difficulty involved in determining actual agency indirect costs and an appropriate basis on which to prorate these costs to special education, this approach was seen as a viable alternative. Given the margin for error in determining special education costs, this approach as tested in the pilot LEA's, provided an approximation of indirect costs within acceptable error limits. Form SP-1 provides accommodation for including the five percent agency indirect allocation in the course of the data collection process.

The purpose of SP-1 is to capture the special education and special needs handicapped costs in secondary/postsecondary institutions. Form SP-1 provides for distribution of both direct and indirect expenditures directly attributable to these programs.

Direct costs for both programs are divided into salary and other direct costs. Direct staff costs should be derived from actual salary figures for all professional and paraprofessional direct service and support personnel assigned to special education or special needs handicapped programs. Other direct costs can be derived from expenditure records covering 12 categories such as materials, travel, inservice, etc.

Indirect agency costs should be allocated as a percentage of the total special education or special needs handicapped expenditures.

It is important to prorate any costs which are attributable to more than one program. Only those costs directly associated with services for special education/special needs handicapped should be included on SP-1.

Data for SP-1 should be the responsibility of the special education/special need program director or coordinator working in conjunction with the chief agency accounting officer.

DETAILED INSTRUCTIONS FOR COMPLETING SP-1
SECONDARY/POSTSECONDARY AGENCY

Item Number	Item Name	Description
01	Special Education Professional Staff Salaries	Enter Special Education professional staff salaries including the appropriate portion of salary for professionals devoting less than full-time to Special Education. Special Education administrative salaries (e.g., Special Education Directors, Supervisors, Coordinators, and substitute teachers) should also be included.
02	Special Education Para-professional Staff Salaries	Enter Special Education paraprofessional staff salaries, including the appropriate portion of salaries for paraprofessionals devoting less than full-time to Special Education. Include salaries of Special Education Aides, nurses serving Special Education, and Substitute Special Education Aides.
03	Special Education Support Personnel Salaries	Enter Special Education support personnel salaries such as OT/PT assistants, clerks, custodians and cooks for stand-alone Special Education buildings, overtime holiday premium pay, etc. Enter the appropriate portion of salaries for individuals devoting less than full-time to Special Education.
04	Fringe Benefits	Fringe benefits for items #1-#2 above. Employee benefits are calculated either on an average of benefits

Item Number	Item Name	Description
		paid all agency personnel or through direct input. Fringes include items such as insurance coverage, worker's compensation, FICA, retirement plans, etc. Method 1 $\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\text{Total Special Ed. Salaries}\right)$ Method 2 Multiply social security (state/local retirement) plus other standard rates (e.g., worker's compensation) times the employee's salary subject to those rates and add dollar values for hospitalization and other benefit costs.
05	Total Special Education Salaries	Enter the sum of items #1-#4 above. This figure represents the total of all direct Special Education salaries and fringe benefits.
06	Professional Materials	Enter the dollar value of professional materials purchases associated with Special Education (e.g., periodicals, books, etc.).
07	Instructional Materials	Enter the dollar value of instructional materials purchases associated with Special Education (e.g., textbooks, workbooks, media materials, etc.).
08	Office Supplies	Enter the dollar value of office supply purchases associated with Special Education (e.g., paper, notebooks, and consumable items).
09	Program Evaluation and Research	Enter the dollar value of contracted services and other costs associated with Special Education evaluation and research. Include outside services on consultants and employers overload.
10	Inservice Staff Development	Enter the dollar value of contracted services and other costs associated with inservice Special Education staff development.

Item Number	Item Name	Description
11	Field Trips	Enter the dollar value of expenditures for Special Education field trips.
12	Staff Travel	Enter the dollar value of expenditures for Special Education staff travel. Include reimbursed travel costs for assignment or for professional meetings.
13	Food Services	Enter the dollar value of food services directly attributable to Special Education. Prorate food services costs within stand-alone Special Education facilities.
14	Service Fees and Tuition	Enter the dollar value of amounts paid to other districts/institutions for service to Special Education students.
15	Fixed Charges	Enter the dollar value of fixed charges directly attributable to Special Education (e.g., heating, building insurance, etc.) in Special Education stand-alone facilities.
16	Special Transportation	Enter the dollar value of transportation services directly attributable to Special Education (between building and Special Education home to school costs). If Special Education students use regular school transportation services, do not include a prorated cost for such.
17	All Other	Enter the dollar value of all expenditures directly attributable to Special Education not included in the above categories. Include items such as direct rental costs of facilities used exclusively for Special Education and any other direct operating costs not associated with previous categories.
18	Total Special Education Direct	Enter the sum of items #6-#17 above. This figure represents the total of all expenditures directly attributable to Special Education (except for salaries and fringe benefits identified separately above).

Item Number	Item Name	Description
19	Special Education Full-Time Enrollment	Enter the numbers of students who spend full-time in a Special Education program. Do not include mainstreamed or part-time Special Education students.
20	Special Education FTE Teachers	Enter the number of full-time equivalent teachers.
21	Special Education Salaries	Transfer the value of item #5 (Total Special Education Salaries) from above.
22	Special Direct Expenditures	Transfer the value of item #18 (Total Special Education Direct) from above.
23a	Total Special Education Expenditures	Enter the sum of items #21 and #22 above. This figure represents the total of all expenditures directly attributable to Special Education.
23b	Special Education Indirect Allocation	Enter 5% of item #23a above. This figure represents the estimated value of agency indirect costs to the Special Education division.
24	Total Special Education Deduct	Enter the sum of items #21-#23 above. This figure represents the total of Special Education costs which will be deducted for purposes of determining the differential cost of vocational education.
25	Special Needs Professional Staff Salaries	Enter Special Needs for the Handicapped Professional Staff salaries including the appropriate portion of salaries for professionals (e.g., licensed tutors, placement and supervisory personnel) devoting less than full-time to Special Needs. Include Special Needs administrative salaries.

Item Number	Item Name	Description
26	Special Needs Support Personnel Salaries	Enter Special Needs for the Handicapped support personnel salaries including the appropriate portion of salaries for support staff devoting less than full-time to Special Needs. Include student tutors and clerical personnel.
27	Fringe Benefits	Fringe benefits for items #25 and #26 above. Employee benefits are calculated either on an average of benefits paid all agency personnel or through direct input. Method 1 $\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\text{Total Special Needs Salaries}\right)$ Method 2 Multiply social security (state/local retirement) plus other standard rates (e.g., worker's compensation) times the employee's salary subject to those rates and add dollar values for hospitalization and other benefit costs.
28	Total Special Needs Salaries	Enter the sum of items #25-#27 above. This figure represents the total of all Special Needs for the Handicapped salaries and fringe benefits.
29	Materials and Supplies	Enter the dollar value of materials and supplies purchases associated with Special Needs for the Handicapped.
30	Staff Travel	Enter the dollar value of expenditures for Special Needs for the Handicapped staff travel.
31	Service Fees and Tuition	Enter the dollar value of amounts paid to other districts/institutions for service to Special Needs for the Handicapped students.
32	Special Needs Transportation	Enter the dollar value of transportation services directly attributable to Special Needs for the Handicapped students. If Special Needs students use regular school transportation

Item Number	Item Name	Description
		services, do not include a prorated cost for such.
33	All Other Special Needs Direct	Enter the dollar value of all expenditures directly attributable to Special Needs for the Handicapped not included in the above categories.
34	Total Special Needs Direct	Enter the sum of items #29-#33 above. This figure represents the dollar value of all expenditures directly attributable to Special Needs for the Handicapped (except for salaries and fringe benefits identified separately above).
35	Special Needs Full-Time Enrollment	Enter the number of Special Needs students who attend a special needs program full-time.
36	Special Needs FTE Teachers	Enter the number of FTE certified/licensed Special Needs teachers.
37	Special Needs Salaries	Transfer the value of item #28 (Total Special Needs Salaries) from above.
38	Special Needs Direct Expenditures	Transfer the value of item #34 (Total Special Needs/Handicapped Direct) from above.
39a	Total Special Needs Expenditures	Enter the sum of items #37 and #38 above. This figure represents the total of all expenditures directly attributable to Special Needs.
39b	Special Needs Indirect Allocation	Enter 5% of item #39a above. This figure represents the estimated value of indirect agency costs of special needs.
40	Total Special Needs Deduct	Enter the sum of items #37-#39 above. This figure represents the total of Special Needs costs which will be deducted for purposes of determining the differential cost of vocational education.

5.3.6 Compensatory Education Costs - Secondary Agency CE-1

Exhibit 5.10 presents the CE-1 form used to derive the costs associated with Compensatory Education programs in secondary agencies. Form CE-1 provides for distribution of both direct and indirect expenditures directly attributable to these programs.

Districts using Financial Accounting Handbook II, Revised may find these expenditures entered in the Instruction Account under line item 1250, Programs for the Culturally Different. For those districts using CE-1 to capture these costs, the following definition from Handbook II will provide a guide for defining the types of program activities whose expenditures should be included on CE-1.

> Special learning experiences for pupils whose background is so different from that of most pupils that they need additional educational opportunities beyond those provided in the usual school program if they are to be educated to the level of their ability.

Some specific program descriptors in this broad area are: Title I, Bilingual Education, Migrant Education, and Compensatory Education.

DETAILED INSTRUCTIONS FOR COMPLETING CE-1
SECONDARY AGENCY

Item Number	Item Name	Description
01	Compensatory Education Professional Staff Salaries	Enter Compensatory Education professional staff salaries including the appropriate portion of salary for professionals devoting less than full-time to Compensatory Education. Compensatory Education administrative salaries (e.g., Compensatory Education Directors, Supervisors, Coordinators, and substitute teachers) should also be included.

EXHIBIT 5.10

CE-1 - Forms Used to Collect Compensatory Education Costs

Secondary Agency

A. COMPENSATORY EDUCATION DIRECT SALARIES

1. Compensatory Ed Professional Staff Salaries $_____
2. Compensatory Ed Para-Professional Staff Salaries _____
3. Compensatory Ed Support Personnel Salaries _____
4. Fringe Benefits for #1-#3 above (@ %) _____
5. Total Compensatory Ed Salaries (sum items #1-#4) $_____

B. COMPENSATORY EDUCATION DIRECT EXPENDITURES

6. Professional Materials $_____
7. Instructional Materials _____
8. Office Supplies _____
9. Program Evaluation and Research _____
10. In-Service Staff Development _____
11. Staff Travel _____
12. All Other Compensatory Ed Direct _____
13. Total Compensatory Ed Direct (sum items #6-#12) $_____

C. STAFF DATA

14. Compensatory Education FTE Teachers $_____

D. COMPENSATORY EDUCATION COST SUMMARY

15. Compensatory Ed Salaries (item #5 above) $_____
16. Compensatory Ed Direct Expenditures (item #13 above) _____
16a. Total Compensatory Ed Expenditures (sum of items #15 and #16 above): $_____
16b. Compensatory Education Indirect Allocation (item #16a x 5%) _____
17. Total Compensatory Ed Deduct (sum items #15-#17) $_____

Item Number	Item Name	Description
02	Compensatory Education Para-professional Staff Salaries	Enter Compensatory Education para-professional staff salaries, including the appropriate portion of salaries for paraprofessionals devoting less than full-time to Compensatory Education. Include salaries of Compensatory Education Aides and Substitute Compensatory Education Aides.
03	Compensatory Education Support Personnel Salaries	Enter Compensatory Education support personnel salaries such as clerks, custodians, and cooks for stand-alone Compensatory Education buildings, overtime holiday premium pay, etc. Enter the appropriate portion of salaries for individuals devoting less than full-time to Compensatory Education.
04	Fringe Benefits	Fringe benefits for items #1-#3 above. Employee benefits are calculated either on an average of benefits paid all agency personnel or through direct input. Fringes include items such as insurance coverage, worker's compensation, FICA, retirement plans, etc. Method 1 $\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\text{Total Comp. Ed. Salaries}\right)$ Method 2 Multiply social security (state/local retirement) plus other standard rates (e.g., worker's compensation) times the employee's salary, subject to those rates, and add dollar values for hospitalization and other benefit costs.
05	Total Compensatory Education Salaries	Enter the sum of items #1-#4 above. This figure represents the total of all direct Compensatory Education salaries and fringe benefits.
06	Professional Materials	Enter the dollar value of professional materials purchases associated with Compensatory Education (e.g., periodicals, books, etc.).

Item Number	Item Name	Description
07	Instructional Materials	Enter the dollar value of instructional materials purchases associated with Compensatory Education (e.g., textbooks, workbooks, media materials, etc.).
08	Office Supplies	Enter the dollar value of office supply purchases associated with Compensatory Education (e.g., paper, notebooks, and consumable items).
09	Program Evaluation and Research	Enter the dollar value of contracted services and other costs associated with Compensatory Education evaluation and research. Include outside services of consultants and employers overload.
10	Inservice Staff Development	Enter the dollar value of contracted services and other costs associated with Inservice Compensatory Education staff development.
11	Staff Travel	Enter the dollar value of expenditures for Compensatory Education staff travel. Include reimbursed travel costs for assignment or for professional meetings.
12	All Other	Enter the dollar value of all expenditures directly attributable to Compensatory Education not included in the above categories. Include items such as direct telephone, direct rental costs of facilities used exclusively for Compensatory Education, and any other direct operating costs not associated with the previous categories.
13	Total Compensatory Education Direct	Enter the sum of items #6-#12 above. This figure represents the total of all expenditures directly attributable to Compensatory Education (except for salaries and fringe benefits identified separately above).
14	Compensatory Education FTE Teachers	Enter the number of full-time equivalent teachers.
15	Compensatory Education Salaries	Transfer the value of item #5 (Total Compensatory Education Salaries) from above.

Item Number	Item Name	Description
16	Compensatory Education Direct Expenditures	Transfer the value of item #13 (Total Compensatory Education Direct) from above.
16a	Total Compensatory Education Expenditures	Enter the sum of items #15 and #16 above. This figure represents the total of all expenditures directly attributable to Compensatory Education.
16b	Compensatory Education Indirect Allocation	Enter 5% of item #16a above. This figure represents the estimated value of indirect agency costs of the Compensatory Education Program.
17	Total Compensatory Education Deduct	Enter the sum of items #15-#16 above. This figure represents the total of Compensatory Education costs which will be deducted for purposes of determining the differential cost of vocational education.

5.3.7 Adult/Continuing Education - Secondary/Postsecondary Agency A/C-1

The purpose of form A/C-1, presented in Exhibit 5.11, is to identify all expenditures associated with Adult/Continuing Education Programs so that these costs may be deducted from the cost of basic education for those LEA's where the regular accounting system does not already separate these costs. Districts which use the Financial Accounting Handbook II, Revised may find the necessary data in Instruction Account 1300 Adult/Continuing Education Programs. For those districts using form A/C-1 to determine the Adult/Continuing Education deduct, the definition from Handbook II listed below will provide a guide for defining the types of program activities whose expenditures should be included on A/C-1.

> Learning experiences designed to develop knowledge and skills to meet immediate and long-range educational objectives of adults

EXHIBIT 5.11

A/C-1 - Forms Used to Collect Adult Basic/Continuing Education Costs

Secondary/Postsecondary Agency

A. ADULT BASIC/CONTINUING EDUCATION DIRECT SALARIES

1. Adult Basic/Continuing Ed Professional Staff Salaries $_____
2. Adult Basic/Continuing Ed Para-Professional Staff Salaries _____
3. Adult Basic/Continuing Ed Support Personnel Salaries _____
4. Fringe Benefits for #1-#3 above (@ %) _____
5. Total Adult Basic/Continuing Ed Salaries (sum items #1-#4) $_____

B. ADULT BASIC/CONTINUING EDUCATION DIRECT EXPENDITURES

6. Professional Materials $_____
7. Instructional Materials _____
8. Office Supplies _____
9. Program Evaluation and Research _____
10. In-Service Staff Development _____
11. Staff Travel _____
12. All Other Adult Basic/Continuing Ed Direct _____
13. Total Adult Basic/Continuing Ed Direct (sum items #6-#12) $_____

C. STAFF DATA

14. Adult Basic/Continuing Ed FTE Teachers $_____

D. ADULT BASIC/CONTINUING EDUCATION COST SUMMARY

15. Adult Basic/Continuing Ed Salaries (item #5 above) $_____
16. Adult Basic/Continuing Ed Direct Expenditures (Item #13 above) _____

16a. Total Adult Basic/Continuing Ed Expenditures (sum of items #15 & #16 above): $_____

16b. Adult Basic/Continuing Ed Indirect Allocation (item #16a x 5%) _____

17. Total Adult Basic/Continuing Ed Deduct (sum items #15-#17) $_____

who, having completed or interrupted formal schooling, have accepted adult roles and responsibilities. Programs include activities to foster the development of fundamental tools of learning; prepare students for a postsecondary career; prepare students for postsecondary education programs; upgrade occupational competence; prepare students for a new or different career; develop skills and appreciations for special interests; or to enrich the aesthetic qualities of life.

Some specific programs included in this broad program area are: Adult Basic Education, Advanced Adult Education Programs, Occupational Programs, Upgrading in Current Occupation Programs, Retraining in New Occupation Programs, Special Interest Programs, and Life Enrichment Programs.

DETAILED INSTRUCTIONS FOR COMPLETING A/C-1
SECONDARY/POSTSECONDARY AGENCY

Item Number	Item Name	Description
01	Adult Basic/ Continuing Education Professional Staff Salaries	Enter Adult Basic/Continuing Education Professional staff salaries including the appropriate portion of salary for professionals devoting less than full-time to Adult Basic/Continuing Education. Adult Basic/Continuing Education administrative salaries (e.g., Adult Basic/Continuing Education Directors, Supervisors, Coordinators, and substitute teachers) should also be included.
02	Adult Basic/ Continuing Education Para-professional Staff Salaries	Enter Adult Basic/Continuing Education paraprofessional staff salaries, including the appropriate portion of salaries for paraprofessionals devoting less than full-time to Adult Basic/Continuing Education. Include salaries of Adult Basic/Continuing Education Aides and Substitute Adult Basic/Continuing Education Aides.
03	Adult Basic/ Continuing Education Support Personnel Salaries	Enter Adult Basic/Continuing Education support personnel salaries such as clerks, custodians and cooks for stand-alone Adult Basic/Continuing Education buildings, overtime holiday premium pay, etc. Enter the appropriate portion of salaries for

Item Number	Item Name	Description
		individuals devoting less than full-time to Adult Basic/Continuing Education.
04	Fringe Benefits	Fringe benefits for items #1-#3 above. Employee benefits are calculated either on an average of benefits paid all agency personnel or through direct input. Fringes include items such as insurance coverage, worker's compensation, FICA, retirement plans, etc. Method 1 $\left(\frac{\text{Total agency employee benefits}}{\text{Total agency salaries}}\right) \times \left(\begin{array}{l}\text{Total Adult/}\\ \text{Basic Continuing}\\ \text{Education Salaries}\end{array}\right)$ Method 2 Multiply social security (state/local retirement) plus other standard rates (e.g., worker's compensation) times the employee's salary, subject to those rates and add dollar values for hospitalization and other benefit costs.
05	Total Adult Basic/ Continuing Education Salaries	Enter the sum of items #1-#4 above. This figure represents the total of all direct Adult Basic/Continuing Education salaries and fringe benefits.
06	Professional Materials	Enter the dollar value of professional materials purchases associated with Adult Basic/Continuing Education (e.g., periodicals, books, etc.).
07	Instructional Materials	Enter the dollar value of instructional materials purchases associated with Adult Basic/Continuing Education (e.g., textbooks, workbooks, media materials, etc.).
08	Office Supplies	Enter the dollar value of office supply purchases associated with Adult Basic/ Continuing Education (e.g., paper, notebooks, and consumable items).

Item Number	Item Name	Description
09	Program Evaluation and Research	Enter the dollar value of contracted services and other costs associated with Adult Basic/Continuing Education evaluation and research. Include outside services of consultants and employers overload.
10	Inservice Staff Development	Enter the dollar value of contracted services and other costs associated with inservice Adult Basic/Continuing Education staff development.
11	Staff Travel	Enter the dollar value of expenditures for Adult Basic/Continuing Education staff travel. Include reimbursed travel costs for assignment or for professional meetings.
12	All Other	Enter the dollar value of all expenditures directly attributable to Adult Basic/Continuing Education not included in the above categories. Include items such as equipment rental, direct telephone, insurance, used exclusively for Adult Education and any other direct operating costs not associated with the previous categories.
13	Total Adult Basic/ Continuing Education Direct	Enter the sum of items #6-#12 above. This figure represents the total of all expenditures directly attributable to Adult Basic/Continuing Education (except for salaries and fringe benefits identified separately above).
14	Adult Basic/ Continuing Education FTE Teachers	Enter the number of full-time equivalent teachers.
15	Adult Basic/ Continuing Education Salaries	Transfer the value of item #5 (Total Adult Basic/Continuing Education salaries) from above.
16	Adult Basic/ Continuing Education Direct Expenditures	Transfer the value of item #13 (Total Adult Basic/Continuing Education Direct) from above.

Item Number	Item Name	Description
16a	Total Adult Basic/ Continuing Education Expenditures	Enter the sum of items #15 and #16 above. This figure represents the total of all expenditures directly attributable to Adult Basic/Continuing Education.
16b	Adult Basic/ Continuing Education Indirect Allocation	Enter 5% of item #16a above. This figure represents the estimated value of agency indirect costs of the Adult Basic/Continuing Education Division.
17	Total Adult Basic/ Continuing Education Deduct	Enter the sum of items #15-#16 above. This figure represents the total of Adult Basic/Continuing Education costs which will be deducted for purposes of determining the differential cost of vocational education.

5.3.8 B-1 Basic Program Costs and Indirect Costs Attribution

The cost of "basic" education programs in both secondary and postsecondary institutions must be determined in order to access the differential or "added cost" of vocational education programs. In order to arrive at the "basic" education program cost, it is necessary to deduct certain program costs which could distort the true cost of basic education. Forms were developed to capture the associated costs of these programs, (i.e., special education, vocational education, compensatory education, and adult-continuing education) for the purpose of deducting those costs from the overall total agency costs. In cases where current accounting procedures have isolated these costs, it may not be necessary to use these forms.

Two types of data are necessary to determine the comparative "basic" program costs and to attribute indirect costs to vocational education programs and courses -- student enrollment

data and expenditure data.

Student enrollments for the fiscal year must be secured. If the fiscal year report encompasses portions of summer terms at both the beginning and the ending of the reporting period, those enrollments must be adjusted to include only the portion of time enrolled for the fiscal period. The most desirable method of student accounting is the full-time-equivalent (FTE) since vocational program enrollment will be based on the FTE count derived from using student contact hours as the divisor. Alternatively, if the agency uses one or more enrollment surveys during the year, use the average of those counts or average-daily-membership (ADM). If average daily attendance (ADA) is the method of student accounting, convert it to ADM or FTE. Finally, if credit (semester or quarter) hour counts form the only basis for student accounting, as is the case for some postsecondary institutions, then determine full-time-equivalent students by dividing total credit hours by the number of credit hours used by the LEA to define a FTE (usually 30 semester hours) for the academic year and then add the credit hours for the appropriate portions of the summer term(s). However, care must be taken to include noncredit enrollments on an equivalent basis. For example, if a noncredit 6 weeks course of instruction is offered, then those enrollments should be converted to full-time-equivalent enrollments irrespective of the method of student accounting used or level of agency instructional programs.

Since the categories for expenditure accounting vary between secondary and postsecondary institutions, two B-1 forms,

Exhibits 5.12 and 5.13, are included -- one for use in secondary agencies and one for use in postsecondary agencies. Essentially, the B-1 form requires data on the total number of FTE students and teachers in all agency programs as well as total agency expenditures and expenditures allocated for deductible programs. Indirect agency costs are classified and attributed on either a student or teacher base.

DETAILED INSTRUCTIONS FOR COMPLETING B-1
SECONDARY SCHOOL

Item Number	Item Name	Description
01	FTE Enrollment	Enter the total full-time-equivalent enrollment in all programs of the agency.
02	V/T FTE Enrollment	Enter the full-time-equivalent enrollment in all vocational programs; sum of item #5, V/T-1.
03	S/E FTE Enrollment	Enter the full-time-equivalent enrollment in all Special Education programs; item #19, SP-1.
04	S/N FTE	Enter the full-time-equivalent enrollment in all special needs programs; item #36, SP-1.
05	Basic Program Enrollment	Enter difference (item #1 minus items #2, #3, and #4).
06	FTE Teachers	Enter the total number of full-time-equivalent teachers in all programs of the agency.
07	V/T FTE	Enter the total number of full-time-equivalent teachers in all vocational programs; sum of item #5, V/T-2.
08	S/E FTE Teachers	Enter the total number of full-time-equivalent teachers in the Special Education program (item #20, SP-1).
09	S/N FTE	Enter the total number of full-time-equivalent teachers in the Special Needs Program (item #36, SP-1).

EXHIBIT 5.12

B-1 - FORM USED TO COLLECT BASIC PROGRAM COSTS AND INDIRECT COSTS ATTRIBUTION

SECONDARY SCHOOL AGENCY

BASIC PROGRAM		ACCOUNT	PURPOSE (less C/O)	COST ATTRIBUTION BASE STUDENT	COST ATTRIBUTION BASE TEACHER
1. Total Agency FTE Enrollment		19. 2100	Student Support Services	$	$
2. Less: V/T FTE Enrollment (sum item #5, VT-1)		20. 2200	Instructional Support Services		
3. Less: S/E FTE Enrollment (item #19, Sp-1)		21. 2300	General Administration		
4. Less: S/N FTE Enrollment (item #35, Sp-1)		22. 2400	School Administration		
5. Basic Program FTE Enrollment (item #1 minus items #2, #3, and #4)		23. 2550	Transportation		
6. Total Agency FTE Teachers		24. Less:	Direct V/T Trans.		
7. Less: V/T FTE Teachers (sum item #4, V/T-2)		25. Less:	Direct S/E Trans.		
8. Less: S/E FTE Teachers (item #20, Sp-1)		26. Less:	Direct S/N Trans.		
9. Less: S/N FTE Teachers (item #36, Sp-1)		27. 2560	Food Services		
10. Less: Comp/Ed FTE Teachers		28. All Other 2500			
11. Basic Program FTE Teachers (item #6 minus items #7, #8, #9 & #10)		29. 2600	Central Services		
12. Total Instructional Costs (minus item #24, #40, SP-1, item #17, CE-1, item #17, A/CE-1).		30. 2700	Other Regular		
13. Less: V/T (sum #15, V/T-4).		31. 3000	Community Services		
14. Total Basic Instruction Costs (item #12 minus item #13).		32. 4000	Non-Programmed Charges		
15. Basic Program Cost/Student (item #14 ÷ item #5)		33. 5000	Debt Services		
16. Indirect Student Base (item #39)			TOTALS	37. $	38. $
17. Indirect Teacher Base $\left(\frac{\text{item \#40 x item \#11}}{\text{item \#5}}\right)$					
18. Total Basic Cost/Student	$				

39. Attribution Per Student (item #37 ÷ item #1)	$
40. Attribution Per Teacher (item #38 ÷ item #6)	$

EXHIBIT 5.13

B-1 - FORM USED TO COLLECT BASIC PROGRAM COSTS AND INDIRECT COSTS ATTRIBUTION

POSTSECONDARY SCHOOL AGENCY

BASIC PROGRAM	
1. Total Agency FTE Enrollment	
2. Less: V/T FTE Enrollment (sum item #5, V/T-1)	
3. Less: S/E FTE Enrollment (item #19, Sp-1)	
4. Less: S/N FTE Enrollment (item #35, Sp-1)	
5. Basic Program FTE Enrollment (item #1 minus items #2, #3, and #4)	
6. Total Agency FTE Teachers	
7. Less: V/T FTE Teachers (sum item #4, V/T-1)	
8. Less: S/E FTE Teachers (item #20, Sp-1)	
9. Less: S/N FTE Teachers (item #36, Sp-1)	
10. Less: Comp/Ed FTE Teachers	
11. Basic Program FTE Teachers (item #6 minus items #7, #8, #9 & #10)	
ACCOUNT 1000 INSTRUCTION	
12. Total Instructional Costs (minus item #24, #40, SP-1, item #17, CE-1, item #17, A/CE-1).	
13. Less: V/T (sum #15, V/T-4)	
14. Total Basic Instruction Costs (item #12 minus item #13).	
15. Basic Program Cost/Student (item #14 ÷ item #5)	
16. Indirect Student Base (item #37)	
17. Indirect Teacher Base $\left(\frac{\text{item \#38} \times \text{item \#11}}{\text{item \#5}}\right)$	
18. Total Basic Cost/Student	$

	ACCOUNT	PURPOSE (less C/O)	COST ATTRIBUTION BASE STUDENT	COST ATTRIBUTION BASE TEACHER
19.	4.100	Libraries	$	$
20.	4.200	Museums and Galleries		
21.	4.300	Audio/visual Services		
22.	4.400	Computing Support		
23.	4.500	Ancillary Support		
24.	4.600	Academic Administration		
25.	4.700	Curriculum Development		
26.	4.800	Academic Personnel Development		
27.	5.000	Student Services		
28.	6.000	Institutional Support		
29.	7.550	Auxiliary - Students		
30.	7.560	Auxiliary - Athletics		
31.	7.660	Auxiliary - Faculty/Staff		
		TOTALS	35. $	36. $

37. Attribution Per Student (item #35 ÷ item #1)	$
38. Attribution Per Teacher (item #36 ÷ item #6)	$

Item Number	Item Name	Description
10	Compensatory Education Teachers	Enter the total number of full-time-equivalent compensatory education teachers (item #14, CE-1).
11	Basic Program FTE Teachers	Enter difference (item #6 minus items #7, #8, #9, and #10).
12	Total Agency Instruction Costs	Enter total agency instruction expenditures minus items #24 and #40, SP-1; item #17, CE-1 and item #17, A/C-1. If using Financial Accounting Handbook II, Revised, some of these costs may be abstracted from instruction accounts 1000, line items 1100, 1200, and 1300.
13	V/T Costs	Enter the total expenditures reported for V/T programs (sum item #15, V/T-4).
14	Total Basic Instruction Costs	Enter difference between item #12 and item #13.
15	Basic Cost/ Student	Enter the quotient of item #14 divided by item #5.
	COMPLETE ITEMS #19 THROUGH ITEM #40 BEFORE ITEMS #16 THROUGH ITEM #18	
16	Indirect Student Base/ Student	Enter item #39.
17	Indirect Teacher Base/ Student	Enter (item #40 times item #11) ÷ item #5.
18	Total Basic Program Cost/ Student	Enter sum of items #15, #16, and #17.

Item Number	Item Name	Description
19	Student Support Services	Attribute costs of student support to students.
20	Instructional Support Services	Attribute costs of instructional support to students.
21	General Administration	Attribute costs of general administration to teachers.
22	School Administration	Attribute costs of school administration to teachers.
23	Transportation	Enter total expenditures for transportation services.
24	V/T Transportation	Enter total expenditures for vocational program transportation, if known and included on V/T-4.
25	S/E Transportation	Enter total expenditures for Special Education transportation, if known.
26	S/N Transportation	Enter total expenditures for Special Needs transportation, if known. Find difference of total expenditures for transportation and known expenditures for V/T, S/E, and S/N transportation. Attribute difference to students.
27	Food Service	Enter agency expenditures for food service. Attribute to students.
28	Other 2500	Enter amount expended for business services (2500) less transportation and food services. Attribute to teachers.
29	Central Services	Attribute to teachers.
30	Other Regular	Attribute to teachers.
31-33	THESE EXPENDITURES ARE NOT TO BE ATTRIBUTED TO PROGRAMS	
34-36	SPACE PROVIDED FOR LOCAL ADAPTATION	

Item Number	Item Name	Description
37	Total Student Attribution	Sum column - student attribution base.
38	Total Teacher Attribution	Sum column - teacher attribution base.
39	Attribution/ Student	Enter the quotient of items #37 ÷ item #1.
40	Attribution/ Teacher	Enter the quotient of item #38 ÷ item #6.

DETAILED INSTRUCTIONS FOR COMPLETING B-1
POSTSECONDARY SCHOOL

Item Number	Item Name	Description
01-11	SAME AS SECONDARY SCHOOL	
12	Total Agency Instruction Costs	Enter total agency instruction expenditures minus items #24 and #40, SP-1, and item #17, A/CE-1.
13-18	SAME AS SECONDARY SCHOOL	
19	Libraries	Enter amount expended for libraries; attribute to students.
20	Museums & Galleries	Enter amounts expended for museums and galleries; attribute to students.
21	A/V Services	Enter amounts expended for audio visual services; attribute to students.
22	Computing Support	Enter amounts expended for computing support relative to instruction; attribute to students.
23	Ancillary Support	Enter amounts expended for ancillary services; attribute to students.
24	Academic Administration	Enter amounts expended for academic administration; attribute to teachers.
25	Curriculum Development	Enter amounts expended for curriculum development; attribute to teachers.

Item Number	Item Name	Description
26	Academic Personnel Development	Enter amount expended for academic personnel development; attribute to teachers.
27	Student Services	Enter amount expended for student services; attribute to students.
28	Institutional Support	Enter amount expended for institutional support; attribute to teachers.
29	Auxiliary Students	Enter amount expended for agency funds for auxiliary student services; attribute to students.
30	Auxiliary Athletics	Enter amount expended from agency funds for athletics; attribute to students.
31	Auxiliary Faculty/ Staff	Enter amount expended from agency funds for auxiliary services for faculty and staff; attribute to teachers.
32-34	SPACE PROVIDED FOR LOCAL ADAPTATION	
35	Total Student Attribution	Sum column - student attribution base.
36	Total Teacher Attribution	Sum column - teacher attribution base.
37	Attribution/ Student	Enter the quotient of item #35 and item #1.
38	Attribution/ Teacher	Enter the quotient of item #36 and item #11.

VI. BURDEN AND COST ESTIMATES FOR CONDUCTING A NATIONAL SURVEY

The RFP required estimates to be developed for the burden upon LEA personnel and for the overall cost of conducting a national survey. While it is possible to base parts of the estimate upon the experience gained from the pilot study, it is impossible to generalize from nine sites. Therefore, the estimates presented in this chapter should be considered to be, at best, "ballpark" in nature.

6.1 LEA BURDEN FOR DATA COLLECTION AT THE NINE PILOT SITES

In an attempt to gather data to make an estimate of burden upon LEA's, EMS asked LEA personnel to record any time spent related to the project. Time was recorded in both professional and clerical areas according to the following general categories:

1) Orientation to Model
2) Data Collection Activities
3) Review of Data with EMS Staff
4) Other

Table 6.1 indicates the record of time utilization at the pilot sites. Professional time ranged from a low of 10 hours to a high of 95 hours. The LEA with 10 hours was one at which EMS staff collected data on site (trained data collector strategy). Neither the LEA which required 95 hours nor the LEA which required 10 hours offered a basic program and the time identified is for the collection of vocational data only. Only 25 hours total were required between the two LEA's where EMS staff performed all data collection activities. This was less than for any other single institution using

another data collection strategy. While the pilot sample of nine does not support major generalizations, it appears clear that the least burden upon the LEA results from using a trained data collection person to work directly with the LEA on site. It would further appear that the data collection model which places the most burden upon the LEA is the off site training of LEA personnel.

Table 6.1

LEA STAFF BURDEN TIME FOR DATA COLLECTION AT PILOT SITES

		Professional					Clerical			
Site	Data Coll. Strat.[1]	Orientation	Data Col.	Review	Other	Prof. Total	Orientation	Data Col.	Other	Clerical Total
A	B	5	13	15	2	35	2	19.5	0	21.5
B[2]	B	7.5	14	8	0	29.5	0	4	0	4
C	C	5	10	0	0	15	0	0	0	0
D	B	5	35	8	0	48	5	10	0	15
E	B	5	28	8	0	41	3	5	0	8
F[2]	A	16	63	16	0	95	0	10	0	10
G[2]	C	4	6	0	0	10	0	0	0	0
H	A	16	16	4	0	36	0	5	4	9
I[3]	A	16	90	0	0	106	0	0	0	0

1: A=Off site training of LEA personnel, B=On site training of LEA personnel, C=Trained Data Collector.

2: Only Vocational Data Collected - LEA did not offer basic program.

3: Due to accounting practices, it was not possible to complete the data collection efforts and the project was abandoned at this LEA.

6.2 ESTIMATED LEA PERSONNEL BURDEN

If the above conclusions are reasonable, one could then attempt to determine an average burden for each data collection model. However, given the diversity of the pilot sites and the limitation of generalizing from a nine site sample, one could not simply calculate the average based upon the site data as it appears

that some unique circumstances are involved, none of which can really be quantified. Thus, only an "educated guess" can be made about an "average" burden for each of the different types of data collection.

Based upon the experience of the study team and data supplied by the pilot sites, estimates for LEA data collection burden are provided in Table 6.2. As can be noted from comparing the data of Table 6.1 to the general estimates of Table 6.2, some of the sample sites' actual burden time fell outside the estimates. However, to provide any reasonable range on the estimate, it must be assumed that some average would be appropriate for making overall estimates and obviously, some LEA's would fall outside the estimated range. Further, these estimates would not necessarily be reflective of very large school systems (probably over 100,000 students) as the number of subprograms would initially be substantially larger and would require more time. However, size alone does not appear to be necessarily the determining factor. Among the pilot sites, some of the larger LEA's actually required less time due to more sophisticated (program orientated) student and financial accounting systems.

Table 6.2

LEA STAFF BURDEN ESTIMATES FOR DATA COLLECTION STRATEGIES

Data Collection Strategy*	Estimated LEA Person Hours**
Off Site Training of LEA Personnel	32 - 64
On Site Training of LEA Personnel	24 - 48
Trained Data Collector	16 - 32

* See definitions presented in Chapter III.

** Professional time only.

6.3 CONTRACTOR BURDEN FOR DATA COLLECTION AT THE PILOT SITES

EMS staff time associated with the actual collection and preparation of data at the pilot sites was recorded and is presented in Table 6.3. The time recorded does not include efforts to secure cooperation from the site, preparation of any forms, nor reportage of data results. It includes only the time used for basic collection and verification processes. The results indicate, excluding the one site which collected only partial data, that a much more uniform amount of time was required by the contractor regardless of the data collection strategy used as compared to the LEA time burden. While one can subject the data to many limitations, experience of the staff suggests that there are some "trade offs" in contractor time among the various data collection strategies. Using the trained data collection strategy, very little time is required for orientation of LEA personnel and the trained collector can start data collection activities almost immediately. While this strategy required more time in actual data collection, it usually required less time for follow-up, review and verification activities. This may, in part, be true because the data collection person became very familiar with the data during the collection process and many of the problems could be addressed at that time.

The time associated with orientation per site under the off site training of LEA personnel strategy could also be reduced substantially if, for example, 20 LEA's participated at one time. Under this situation the time could be reduced to one or two hours each. However, a subjective assessment of this strategy by the study team suggests that this type of collection strategy poses the most problems as far as accuracy and thus requires more follow-up and review

time by the contractor. As a consequence, the subjective impressions of the study team suggest that the on site training of LEA personnel strategy was somewhat more effective than the off site training strategy and contributed to more accurate data.

Table 6.3

CONTRACTOR STAFF BURDEN TIME FOR DATA COLLECTION AT PILOT SITES

		Professional				Clerical
Site	Data Coll. Strat.[1]	Orientation	Data Collection	Review/Prep.	Total	Data/Prep.
A	B	4	6	34	44	3
B	B	4	4	17	25	0
C	C	2	14	18	34	4
D	B	6	1	47	54	6
E	B	5	3	42	50	5
F	A	5[3]	16	37	58	7
G	C	2	14	22	38	5
H	A	5[3]	0	23	20	2
I[2]	A	5[3]	0	5	10	0

1: A=Off site training of LEA personnel, B=On site training of LEA personnel, C=Trained Data Collector.

2: Due to accounting practices, it was not possible to complete the data collection efforts and the project was abandoned at this LEA.

3: 15 hours among three sites.

6.4 ESTIMATED CONTRACTOR PERSONNEL BURDEN

As stated in the previous section, these estimates reflect the time required for actual data collection and preparation only and do not include any time allocation for arranging for site participation, nor assembly and report preparation following the securing of the data. Further, these estimates are, at best, subjective given the limited experience at the nine sites. However, based upon the experience of the staff, it does appear reasonable to conclude that it makes little difference for contractor burden as to the data

collection strategy used. Further it would appear that a reasonable time estimate would be in the range of 32 to 48 person hours per LEA. Again, as with the estimates for LEA burden, many factors would influence these estimates including the magnitude of LEA enrollment and the degree to which LEA's have program orientated student and financial accounting systems.

6.5 BURDEN UPON STATE AGENCIES

The RFP required that attention be given to the burden upon state agencies. The manner in which the pilot test was conducted, placed almost no burden upon state agencies. EMS initially contacted state agencies for advice relative to the selection of a particular type of LEA within the state. Beyond a "few minutes" of telephone conversation with state personnel, no other specific requests were made. All data collection was done at the LEA level and did not require any participation from state agencies.

To conduct a national survey would not necessarily require any burden upon the state agency. However, two factors should be considered. If a national survey were conducted, there would be significant activity in many states and the "interest level" of state personnel would probably be such as to make it advisable and practical to offer some form of orientation to state personnel. Many models could be used to accomplish this purpose from individual visits to vocational departments in these states where specific activities would be taking place to a full-scale national conference. This question, EMS feels, is a policy question for BOAE rather than a procedural question involved in the specific design of a national survey.

The second area where states could and probably should be involved with a national survey would be to assist the contractor in developing the specifics of the sample as it pertains to a given state. The sampling plan presented in Chapter IV suggested that various geographical areas be chosen initially and then within these areas, specific LEA's be selected. It would appear that state personnel could not only provide valuable data about the status of the LEA's located in the sample area but could also facilitate cooperation with the institutions. It is estimated that this level of involvement would create a time burden upon state personnel of from 16 to 32 person hours per state. The actual number of states which would be involved in the national sample would not be known until the actual sample is selected but would probably not exceed 25 to 30.

6.6 COST ESTIMATES FOR A NATIONAL SURVEY

6.6.1 Assumptions Contained in the Cost Estimates

Several assumptions must be made about the conduct of a national survey before cost estimates can be attached. The major assumptions used to derive the cost estimates presented in the next section are discussed below:

- Sample size of 360 LEA's - This assumption reflects the sample plan presented in Chapter IV with 60 four-year institutions and 300 LEA's in the other categories. A sample size of 180 will also be estimated for comparative purposes.
- Data will be collected by trained data collection personnel - Actually this assumption will not substantially affect actual data collection costs on

the part of the contractor (see previous discussion).

- Cost is estimated in 1979 dollars - Since it is unknown what year the survey might be conducted, it would be difficult to inflate costs.
- Subprogram level data would be collected - If program level data were collected, it could reduce both the LEA burden and overall costs.
- Professional person day equals $300 - This rate could be assumed to include clerical support services and would reflect a "blend" of high and low cost staff.

6.6.2 Estimated Budgets for a National Survey

Table 6.4 presents an estimated budget based upon the previous assumptions using 360 LEA samples. A similar budget, but using 180 LEA samples, is presented in Table 6.5. As can be seen from both of the budgets, the cost estimate is substantial. It is difficult to provide any comparison costs of similar studies because none have been done. However, the Department of Vocational/Technical Education of the State of Illinois recently issued a RFP to do a statewide study of the differential cost of vocational education. The resources available for this effort were $60,000.

The cost estimates are driven substantially by the large number of sites needed for the sample. Reducing the sample by one-half reduces the estimated cost by nearly one-half also. Some potential cost savings could be obtained by combining and better scheduling of travel to reduce travel and per diem costs. However, since approximately 70% of the estimated cost is tied

Table 6.4

ESTIMATED CONTRACTOR COST FOR NATIONAL SURVEY

(360 SAMPLES)

Phase I -	Planning/Sampling/State Interface/ Securing Approval for Participation:	
	Planning, 20 days @ $300/day	$ 6,000
	Sampling, 30 days @ $300/day	$ 9,000
	State Interface, 30 days @ $300/day	$ 9,000
	LEA Participation Approval, 90 days @ $300/day	$ 27,000
Phase II -	Data Collection:	
	Actual Collection, 5 days/site, 1,800 days @ $300/day	$540,000
	Travel and Per Diem;	
	Travel, 360 trips @ $200/trip	$ 72,000
	Per Diem, 1,440 days @ $50/day	$ 72,000
	Materials and Communication	$ 10,000
Phase III -	Analysis and Reportage:	
	Data Preparation (including computer support)	$ 10,000
	Data Analysis and Report Preparation @ one day per sample 360 days @ $300/day	$108,000
Phase IV -	Management:	
	100 days @ $300/day	$ 30,000
	Other	$ 5,000
	Total	$898,000

Table 6.5

ESTIMATED CONTRACTOR COST FOR NATIONAL SURVEY

(180 SAMPLES)

Phase I -	Planning/Sampling/State Interface/ Securing Approval for Participation:	
	Planning, 20 days @ $300/day	$ 6,000
	Sampling, 30 days @ $300/day	$ 9,000
	State Interface, 20 days @ $300/day	$ 6,000
	LEA Participation Approval, 90 days @ $300/day	$ 15,000
Phase II -	Data Collection:	
	Actual Collection, 5 days/site, 900 days @ $300/day	$270,000
	Travel and Per Diem;	
	Travel, 180 trips @ $200/trip	$ 36,000
	Per Diem, 720 days @ $50/day	$ 36,000
	Materials and Communication	$ 5,000
Phase III -	Analysis and Reportage:	
	Data Preparation (including computer support)	$ 8,000
	Data Analysis and Report Preparation @ one day per sample 180 days @ $300/day	$ 54,000
Phase IV -	Management:	
	60 days @ $300/day	$ 18,000
	Other	$ 5,000
	Total	$464,000

directly to data collection and analysis, probably the only meaningful way to reduce costs is either to reduce the complexity of data collection and/or reduce the sample size.

The sampling plan presented in Chapter IV suggested that, if anything, the sample size be increased. This would require even more financial resources. Since the cost of data collection is the major cost, and since experience would suggest little difference in time required under different collection strategies, it would appear that if cost is a limiting factor for a nationwide survey, some major departure from the suggested design would be required. In essence, to reduce costs one must reduce data collection efforts.

There appears to be three possible ways to reduce data collection. First, the sample number could be reduced. Assuming "all else equal" this procedure would increase the error of the estimate as discussed in Chapter IV. Depending upon the degree of error which could be tolerated, this may or may not be a possibility.

Second, the data collection process could be changed to the paper/pencil strategy as described in Chapter III. However, experience of the study suggests that the survey could not be accomplished in this way using the current model. The study team would strongly recommend against changing to this method based upon experiences with the pilot sites.

A third means of reducing the cost would be to determine costs at the program level rather than at the subprogram level. Collecting data in this way would not only reduce the number of sample points, but also reduce the complexity

and time of the data collection effort. It would further appear that a modification of the program/subprogram classification could also be considered. A further possibility might be to break a given program area into, say, three or four subclassifications rather than the number of subprograms that currently exists. If this were done in an appropriate manner, the sampling plan could still be used and the number of LEA's could probably be reduced substantially.

6.7 TIMELINE FOR CONDUCTING A NATIONAL SURVEY

In developing a timeline for a national survey, there are several important considerations. First, the cost data should be collected for the same fiscal year. This would suggest that the data collection effort should start as soon after the close of the fiscal year as final expenditure data would be available. Although audited data may not be available until several months after the close of a fiscal year, for practical purposes, most institutions would have a trial balance in two to four months. This would suggest the data collection phase could start in October or November to minimize the aging of data.

A second consideration would be the time period devoted to data collection. As discussed previously, the ability of the contractor to control the data collection timeline is very much a function of the type of data collection strategy used. Only under the trained data collector strategy does the contractor have substantial control. Under this model, if the LEA agrees to cooperate, and if the collector can get on site, usually all the data can be collected before the data collector leaves. Under the other

strategies, the LEA has the major responsibility for data collection and preparation and, thus, makes its own schedule. No matter what method is chosen, it would appear that a minimum of twelve months should be allowed for the data collection effort. In addition, it would appear that four (4) to six (6) months should be scheduled for the preparation phase, and a minimum of six (6) months for the data analysis phase. This timeline is presented in more detail in Figure 6.1. If the number of LEA's were reduced to 180 rather than the 360, the process could be condensed from 6 to 10 months.

The tasks/activities suggested in Figure 6.1 are illustrative of some of the major requirements of a nationwide survey and should not be considered inclusive of all necessary activities. Likewise, the timeline suggested is to establish "relative" sequencing of major activities and does not necessarily reflect the interrelationships of an exhaustive delineation of interactivities. For example, it would be possible to sequence the sampling/LEA approval activities by census region, or possibly by cluster. This would allow data collection activities to start prior to the completion of the entire sample/approval process.

Figure 6.1

SUGGESTED TASK/ACTIVITY TIMELINE FOR A NATIONWIDE SURVEY

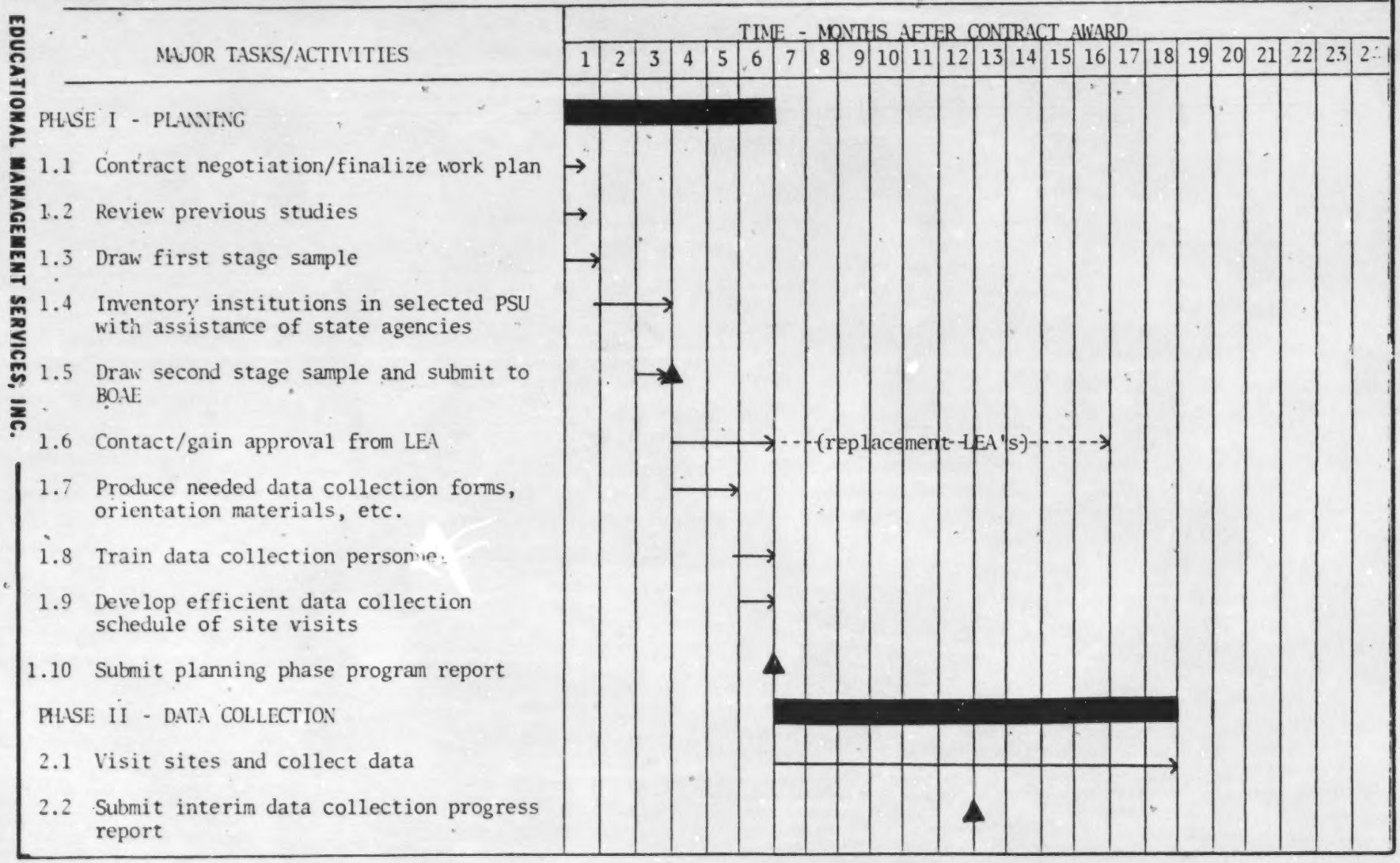
MAJOR TASKS/ACTIVITIES
TIME - MONTHS AFTER CONTRACT AWARD
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
PHASE I - PLANNING
1.1 Contract negotiation/finalize work plan
1.2 Review previous studies
1.3 Draw first stage sample
1.4 Inventory institutions in selected PSU with assistance of state agencies
1.5 Draw second stage sample and submit to BOAE
1.6 Contact/gain approval from LEA
(replacement LEA's)
1.7 Produce needed data collection forms, orientation materials, etc.
1.8 Train data collection personnel
1.9 Develop efficient data collection schedule of site visits
1.10 Submit planning phase program report
PHASE II - DATA COLLECTION
2.1 Visit sites and collect data
2.2 Submit interim data collection progress report

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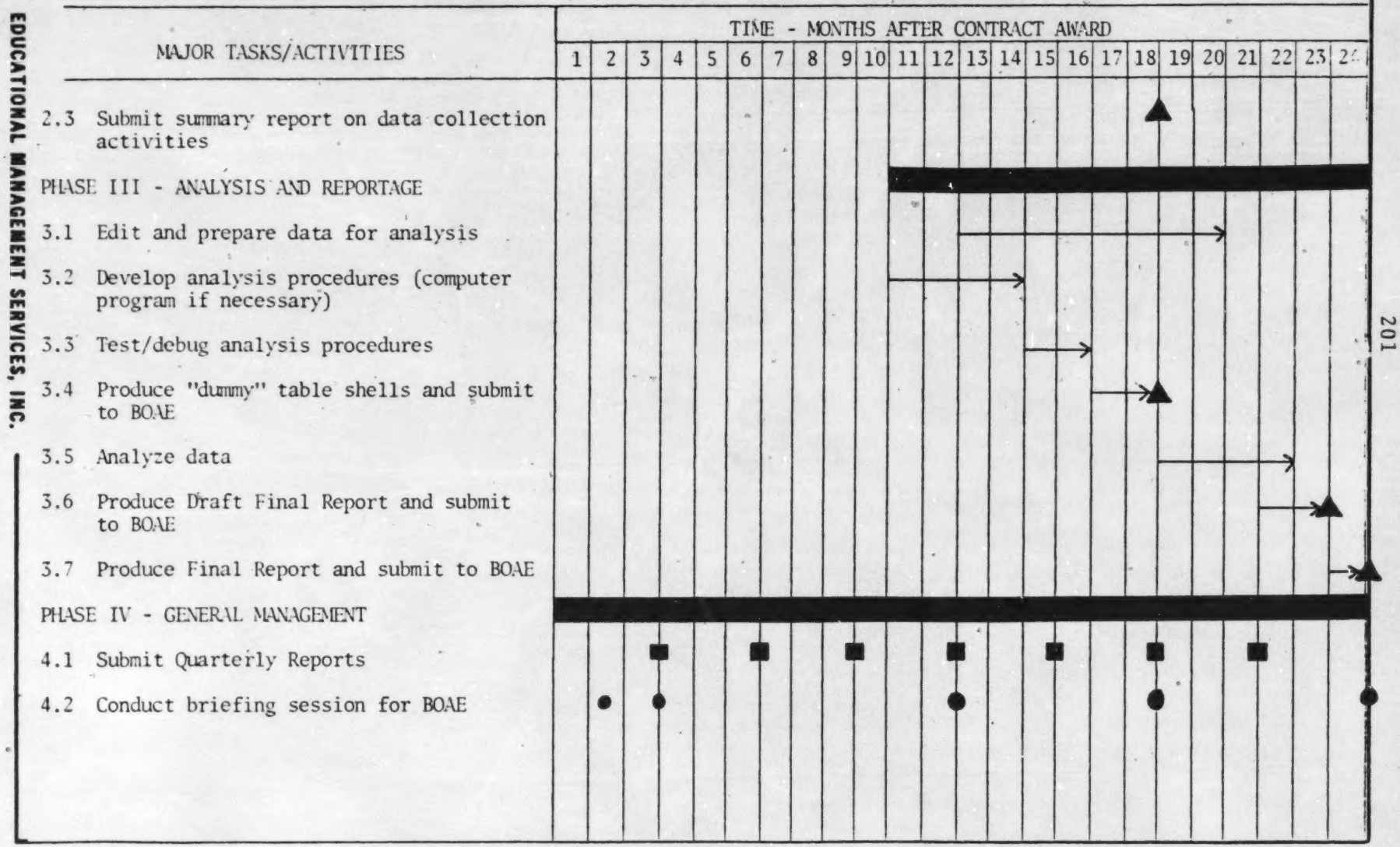
Figure 6.1 (cont'd)

SUGGESTED TASK/ACTIVITY TIMELINE FOR A NATIONWIDE SURVEY


MAJOR TASKS/ACTIVITIES
TIME - MONTHS AFTER CONTRACT AWARD
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
2.3 Submit summary report on data collection activities
PHASE III - ANALYSIS AND REPORTAGE
3.1 Edit and prepare data for analysis
3.2 Develop analysis procedures (computer program if necessary)
3.3 Test/debug analysis procedures
3.4 Produce "dummy" table shells and submit to BOAE
3.5 Analyze data
3.6 Produce Draft Final Report and submit to BOAE
3.7 Produce Final Report and submit to BOAE
PHASE IV - GENERAL MANAGEMENT
4.1 Submit Quarterly Reports
4.2 Conduct briefing session for BOAE

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VII. CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter briefly presents some of the major conclusions and recommendations that appear to be warranted by this study. No attempt has been made to list these items in any order of priority, nor is extensive discussion provided. In the case of the recommendations, some actually raise further questions for policy makers rather than suggest solutions.

7.2 CONCLUSIONS

Based upon the experience gained from this effort, the following conclusions are appropriate:

1) The differential cost model is a complicated but an appropriate means of determining costs differentials. As noted throughout the report, data collection burden of the model is extensive and consequently, may limit its ability as a practical means of conducting a nationwide survey. However, it should be noted that the model, when properly applied, appears to yield the desired results.

2) The differential cost model can appropriately determine the differential costs of vocational education subprograms as defined in Handbook VI. Further, the model could be used to determine cost differential at other levels of aggregation.

3) Data collection burden upon LEA personnel is directly

related to the type of data collection strategy utilized. Results from the pilot test sites indicate the least burden upon LEA personnel occurs when local personnel are assisted by trained data collectors.

4) Data collection burden upon LEA's is generally more closely related to the type of student and financial accounting systems used than to the number of vocational programs offered. Where LEA's employed some form of program oriented accounting system, data collection burdens were reduced substantially.

5) LEA financial accounting systems may limit the degree to which direct vocational program costs can be identified. This conclusion follows (4) above. Some relatively high expenditure items may not be distinguishable to the subprogram level and thus are "averaged" out over all vocational programs or even with basic programs.

6) While the theory of the model is appropriate, in practical application, it may be difficult to obtain an appropriate basic cost reference for certain vocational institutions. Institutions which offer only vocational programs will require an external reference point from which to determine the cost differential and depending upon the circumstances, such references could be inappropriate.

7) The level of program cost aggregation will significantly affect cost and burden estimates for conducting

a national survey. This study tested the methodology at the subprogram level as defined by Handbook VI. If aggregation were made at the program level, both the number of sample sites and the amount of data collection required for a given LEA could be reduced.

8) Experience with the pilot sites suggests that the trained data collector strategy for obtaining LEA data is the best overall strategy. Results of time requirements for data collection indicate tradeoffs between the strategies. For strategies where trained (contractor) personnel are involved extensively at the initial collection point, relatively less follow-up is required and vice versa, less initial involvement requires greater follow-up activity. The trained data collector strategy reduced LEA burden and appeared to produce the greatest accuracy.

7.3 RECOMMENDATIONS

The following recommendations are offered for consideration to BOAE policy makers as they determine the feasibility of undertaking a national survey.

It is recommended that:

1) Cost differential data be aggregated at the program level rather than at the subprogram level. As noted throughout the report, the data collection burden of this model is extensive and may limit its ability as a practical means of conducting a nationwide survey. While this question is really a policy issue

and reflects the need for data at a given level, if this recommendation were followed, it could reduce overall cost of a survey, reduce LEA burden and probably improve the accuracy of the data gathered.

2) Depending upon the level of accuracy required, consideration should be given to developing and using some simplified "proxy" method to estimate differential costs. Since the model's data requirements are complicated, it might prove useful to attempt to isolate a few significant indicators of cost differential. Such factors might be the comparison of pupil/teacher ratios in selected vocational programs to basic programs; the comparison of average teacher salaries in vocational and basic programs; and the comparison of the supply costs per vocational and basic student, to name a few. If such proxy measures could be developed, it might significantly enhance the feasibility of a nationwide survey.

3) Guidelines be developed for excluding from a sample, those LEA's for which data collection would be "over burdensome" and/or for which an appropriate basic cost reference does not exist. One of the nine pilot sites could not complete data collection because accounting practices did not allow retrieval of data. Four of the nine sites required an external reference for basic cost. It would be expected that these problems would be multiplied in a larger sample.

4) BOAE policy makers recognize that the differential cost model with its various procedures suggested in this report produces an estimated rather than an absolute result. Based upon experience at the pilot sites, the efficiency of data collection must be balanced against accuracy. This is not to imply the model itself is inaccurate. In theory, it is sound, but in the practical problems of data collection at LEA's, the law of diminishing returns appears and unless extraordinary resources are devoted to data collection, some approximations will have to be made.

5) If a nationwide survey is conducted using the procedures outlined in this report, it should be done using trained data collectors. Many factors argue for this recommendation, not the least of which is the reduced amount of LEA burden.

6) BOAE policy makers recognize that while the importance of an appropriate sample should not be ignored, the most critical aspect of a nationwide study will probably be the ability of the LEA's to provide data in the required format. Error in obtaining national estimates could arise from the statistical properties of the sampling plan, but probably of greater concern should be the errors which are introduced through the measurement or data collection process.

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EXECUTIVE SUMMARY

PLANNING DESIGN FOR CONDUCTING A NATIONAL SURVEY OF THE DIFFERENTIAL COST OF VOCATIONAL EDUCATION

(CONTRACT #300780524)

DECEMBER, 1979

EDUCATIONAL MANAGEMENT SERVICES, INC.

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EXECUTIVE SUMMARY

PLANNING DESIGN FOR CONDUCTING A NATIONAL SURVEY OF THE DIFFERENTIAL COST OF VOCATIONAL EDUCATION

I. BACKGROUND

The cost of educating students has received more and more attention in recent years. This may, in part, be the result of greater competition for available resources. Whatever its origin, the trend has required the educational community to devise new and better methods to determine the costs of specific educational programs. One such effort was completed in 1977 by the Institute of Educational Finance (IEF) under contract number 300760410 to the U. S. Office of Education. The IEF study developed a comprehensive program costing model for vocational education. The model produces a comparison between the cost of operating a given vocational program and the average aggregate cost of operating all basic education programs. The model is applicable for both the secondary and post secondary level programs and can distinguish costs among different types of instititutions.

Development of the differential cost model was a first step in a process for obtaining cost information on which to base decisions. The Bureau of Occupational and Adult Education (BOAE) identified a second step as the development of a planning design for a nationwide survey using the methodology of the IEF model. The efforts documented in this report represent the activities completed for that planning design.

II. SCOPE OF THE STUDY

The planning study assumed the development of the IEF differential cost model and could be viewed as an extension of that study. To the extent possible, IEF methodology was to be used except for certain prescribed modifications. BOAE specified that a modification be made to the IEF model to allow for the removal of costs associated with the education of the handicapped. Thus, the handicapped modification became one of the major goals of the study.

A second major goal of the study was to field test the forms and procedures of the IEF model as well as any new forms and procedures developed as a result of the handicapped modification. A third major goal was to define an appropriate sampling procedure for conducting a nationwide survey. However, it was not a requirement of the study to actually "draw" the sample.

III. PRODUCTS OF THE STUDY

The planning study produced three formal documents: 1) Abstract; 2) Executive Summary; and 3) Final Report. In addition to an introduction chapter, the final report has six other chapters. These are: 1) Modifications to the Differential Cost Model; 2) Field Test Results; 3) The Sampling Plan; 4) Data Collection Forms and Procedures; 5) Burden and Cost Estimates for Conducting a Nationwide Survey; and 6) Conclusions and Recommendations. The remaining parts of this document summarize those topics.

3.1 MODIFICATIONS TO THE DIFFERENTIAL COST MODEL

Programs to educate handicapped students have traditionally been recognized as relatively high cost. Excluding or deducting these costs from the cost of basic education therefore reduces the cost of basic education per full time equivalent (FTE) student. This is especially true in elementary-secondary education (as opposed to postsecondary) where handicapped expenditures normally constitute a larger portion of total expenses.

In an effort to simplify data collection several methods were explored as a basis for the handicapped deduct system. These included models based upon the number of FTE students, FTE staff, categorical aids and actual expenditures of programs for the handicapped. It was shown that all but the expenditure (cost) model tend to underestimate the true cost/FTE handicapped student. The expenditure model, in addition to giving the most accurate estimates, also required the most extensive data collection efforts. However, the data collection procedures were devised to parallel those used in the vocational differential cost model to simplify its understanding. Further, it was shown that some error could be tolerated by the model without significantly affecting the accuracy of the results. For this reason certain approximations were made to the expenditure model to reduce data collection burden.

The handicapped deduct system sets forth standard definitions to be used in identifying students served. However, the model acknowledges that no definition is universally accepted nor applied. For this reason some uncertainty is expected both in cost determination and student determination. Thus, since the model is not overly sensitive, small deviations in both student and cost accounting can occur without noticeable effects upon the vocational differential cost model results.

The number of student FTE's served by programs for the handicapped was also needed for the deduct modification. Some states have procedures for counting all students served by programs for the handicapped even if the students are in "main-streamed" programs. Using this procedure, a student is counted any time service is provided proportional to the time service is provided. This method of counting student FTE's may be constrasted to the "replacement" method where students are counted as being part of a program for the handicapped only when their "place" can be taken by another student in the regular classroom setting. Using the latter method, mainstreamed students would not be counted and only those students who are in self contained settings where "replacement" could occur would be counted as handicapped students.

The latter method of counting FTE students served by programs for the handicapped was adopted for the deduct modification. The effect of the replacement method was to "deduct" fewer handicapped FTE's from the number of basic FTE's and, hence, the net cost of basic education per FTE student was slightly less than if the other method of counting students had been used. Another effect of this method was to reduce data collection burden associated with identifying the number of FTE handicapped students.

While the handicapped deduct was the most extensive modification, other deduct systems for compensatory education, adult education and other specialized program costs were also developed in order to determine the true cost of basic education. Based upon results of the pilot test, these additional modifications appear to be needed only at the secondary level as none were used in the postsecondary level.

Another area in which this study differed from the IEF effort was the level of data collected. The IEF study tested the model at the broad vocational program level (01.00.00 Agriculture as defined by Handbook VI) whereas the planning study tested the model at the subprogram level (01.01.00 Agriculture Production). While the general concept of the differential cost model accommodated such an analysis, some minor modifications were made in forms and procedures to facilitate data collection at the subprogram level.

3.2 FIELD TEST RESULTS

Instrumentation and procedures were field tested at nine pilot sites. These sites were selected according to the criteria contained in the final report and were heterogeneous rather than necessarily proportionally representative of the universe. This was important because one of the major intents of the study was to test the forms and procedures under as many diverse situations as possible. Sites selected included secondary schools in the states of North Dakota, Texas, Utah, and Minnesota, postsecondary institutions in Indiana, Minnesota and South Carolina, community colleges in Texas and Indiana; and a four year college in the state of Idaho.

The study intended to test four methods of data collection. These were termed: 1) Paper/pencil survey; 2) Off site training of agency personnel 3) On site training of agency personnel and 4) Trained contractor data collector. The paper/pencil method was to send the forms and a User Manual to the site and request the local educational agency (LEA) personnel to collect and record all needed data. The off site training of agency personnel model brought LEA personnel to a central site for training in the use of the forms and procedures. Once trained, the people were expected to go back and collect the data according to model requirements. A somewhat more personalized training was provided to LEA personnel through the on site training of agency personnel. Using this method, a person on the contractor's staff visited the LEA for no more than one day and trained site personnel and assisted them in "getting started". The final method, using a trained contractor data collector, a person from the contractor's staff was responsible for all data collection at the LEA.

The methods were tested for two main purposes. First, to determine the receptivity and burden upon the LEA's and second to determine the accuracy of data collected. While one is cautioned not to over generalize from a nine sample test, it does appear reasonable to make the following observations:

1) *LEA's refused to participate in the paper/pencil method citing the extensive data collection requirements of the model. Thus, this method was not actually tested and was abandoned as a means of data collection.*

2) *Burden upon LEA personnel was greatest using the off site training model and least using the trained contractor personnel for data collection.*

3) *To obtain data of "equal quality" little difference was observed in the burden rate upon the contractor for the three methods of data collection. Further, it appears to be very difficult to obtain accurate data from the LEA because of the complex and extensive model requirements, unless a trained contractor person is substantially involved in the collection process.*

4) *The type of data collection strategy used significantly affects the response time. When the LEA was primarily responsible for data collection priority was often low and deadlines for completion were often bypassed. When the contractor was responsible, greater control could be exerted and hence better adherence to timelines occurred.*

The differential cost methodology assumes a reference point (basic education) to which vocational costs are compared. The sample selected contained several LEA's which did not offer a comprehensive education program and, hence, there was not a basic education program within the LEA for comparison. While in some instances it appeared obvious as to what should be used as the basic education cost reference point, other situations were more complex. Therefore, criteria were developed by the project for selecting basic education cost references outside the LEA containing the vocational programs of interest. These criteria identify a number of factors and are presented in detail in the final report.

Although the intent of the study was not to produce cost results, data relative to the differential cost of vocational education are presented in the final report from the pilot sites. The results demonstrate that the model can be applied at the subprogram level to obtain estimates of the differential cost of vocational education programs. It is important to note that no generalization should be made based upon the results from the pilot sites because of the small sample size.

3.3 *THE SAMPLE PLAN*

The final report details a sampling plan for conducting a nationwide survey. The sampling plan presented has some unique aspects for the following reasons:

1) *No definition of the universe of vocation subprograms (using Handbook VI definitions) could be secured. Hence,*

the sampling plan is built upon the "probability" of finding subprograms at a given LEA.

2) An assumption was made, based upon the extensive data collection requirements of the model, that once a subprogram is selected for inclusion, all subprograms at the given LEA would be included in the sample.

The sampling plan presents two separate but related methods for sample selection. One method details the procedure for selection of secondary, postsecondary technical instititutions, and community colleges. The Vocational Facilities Data Tape, the major source used by the project to describe these institutions, suggests a possible universe of nearly 8,500 sites (see final report for definition of "site"). The second sampling method relates to four year colleges. National Center for Educational Statistics sources indicate that only about 250 four year colleges offer vocational programs. The remaining discussion of the sampling plan focuses upon LEA's other than four year colleges. The sampling plan for four year colleges is presented in detail in the final report document and parallels the plan for the other LEA's described below.

The sampling strategy is divided into two main stages. Using existing data sources, the first stage would identify primary sampling units (PSU's) which would be composed of clusters of LEA's identified by the first three zip code digits of their address. These clusters would be selected on a number of dimensions to be representative of the universe. Once the clusters are selected, each cluster would be examined and redefined as to the number and type of LEA's and also as to the types of programs available in each LEA. This process would then provide an accurate picture of the portion of the universe selected and allow the second stage of the sampling process to proceed upon an accurate definition of the cluster. Following this, sites within the cluster would then be selected based upon additional dimensions including the types of vocational programs offered. It is suggested this type of procedure be used to select approximately 300 LEA's.

A coefficient of variation statistic would be used to develop error estimates for the sample. While this method can identify a range of possible errors, no specific estimates could be given in the final report because of the unknown characteristics of the universe. The report also suggests that even if the error due to sampling could be fully determined, the error in measurement (derived from the estimation procedures of the differential cost model) are also unknowns and may be of greater consequence than the statistical sampling error.

3.4 DATA COLLECTION FORMS AND PROCEDURES

The final report contains extensive documentation on forms and procedures to be used in the nationwide survey. To the extent possible, IEF forms and procedures have been utilized. Also included are sample materials as used for orientation of LEA personnel to the differential cost model. The report also notes that unique LEA characteristics, coupled with the extensive data collection requirements of the differential cost model, make it difficult, (if not impossible) to rely totally upon one set of generalized data collection forms.

3.5 BURDEN AND COST ESTIMATES FOR CONDUCTING A NATIONWIDE SURVEY

Burden estimates were developed for LEA's, state educational agencies, and for contractor assistance to complete a nationwide survey. The estimates provide a range based on an "average" LEA. Very large LEA's and/or LEA's with unique situations would require substantially more effort for data collection than the "typical" LEA.

Data collection burden upon LEA personnel was estimated to range from 16 to 32 person hours for the model using a trained contractor data collection person, to 32 to 64 hours for LEA personnel trained off site. Results from the pilot test also suggest little difference for contractor burden, no matter which data collection strategy was used. Burden for the contractor was estimated to range from 32 to 48 person hours per LEA.

Only a minimal amount of data collection burden would be required from state education agency personnel. Involvement of state personnel would occur mainly between the first and second stage of the sampling plan to assist the contractor in updating information about the institutions contained in a selected PSU. Burden upon state personnel was estimated to range from 16 to 32 person hours per state.

To develop overall cost estimates for contractor assistance several assumptions were necessary. One assumption specified in the final report was that data would be collected at the subprogram level using contractor personnel. For a sample size of 360 LEA's (includes 60 four year colleges) the total cost was estimated to be nearly $900,000. Since a major portion of the cost is related directly to actual data collection, reducing the sample size to 180 LEA's reduced the estimated cost to nearly one half, $464,000.

3.6 CONCLUSION AND RECOMMENDATIONS

The study produced several conclusions and recommendations. The conclusions presented in the final report were:

1) *The differential cost model is a complicated but appropriate means of determining costs differentials. As noted throughout the report, data collection burden of the model is extensive and consequently may limit its ability as a practical means of conducting a nationwide survey. However, it should be noted that the model, when properly applied, appears to yield the desired results.*

2) *The differential cost model can appropriately determine the differential costs of vocational education subprograms as defined in Handbook VI. Further, the model could be used to determine cost differentials at other levels of aggregation.*

3) *Data collection burden upon LEA personnel is directly related to the type of data collection strategy utilized. Results from the pilot test sites indicate the least burden upon LEA personnel occurs when local personnel are assisted by trained data collectors.*

4) *Data collection burden upon LEA's is generally more closely related to the type of student and financial accounting systems used than to the number of vocational programs offered. Where LEA's employed some form of program oriented accounting system, data collection burdens were reduced substantially.*

5) *LEA financial accounting systems may limit the degree to which direct vocational program costs can be identified. This conclusion follows (4) above. Some relatively high expenditure items may not be distinguishable at the subprogram level and thus are "averaged" out over all vocational programs or even with basic programs.*

6) *While the theory of the model is appropriate, in practical application, it may be difficult to obtain an appropriate basic cost reference for certain vocational institutions. Institutions which offer only vocational programs will require an external reference point from which to determine the cost differential and depending upon the circumstances, such references could be inappropriate.*

7) *The level of program cost aggregation will significantly affect cost and burden estimates for conducting a national survey. This study tested the methodology at the subprogram level as defined by Handbook VI. If aggregation were made at the program level, both the number of sample sites and the amount of data collection required for a given LEA could be reduced.*

8) *Experience with the pilot sites suggests that the trained contractor data collector strategy for obtaining LEA data is the best overall strategy. Results of time requirements for data collection indicate tradeoffs between the strategies. For strategies where trained (contractor) personnel are involved extensively at the initial collection point, relatively less follow-up is required and vice versa, less initial involvement requires greater follow-up activity. The trained data collector strategy reduced LEA burden and appeared to produce the greatest accuracy.*

The study also made several recommendations as follows:

It was recommended that:

1) *Cost differential data be aggregated at the program level rather than at the subprogram level. As noted throughout the report, the data collection burden of this model is extensive and may limit its ability as a practical means of conducting a nationwide survey. While this question is really a policy issue and reflects the need for data at a given level, if this recommendation were followed, it could reduce the overall cost of a survey, reduce LEA burden, and probably improve the accuracy of the data gathered.*

2) *Depending upon the level of accuracy required, consideration be given to developing and using some simplified "proxy" method to estimate differential costs. Since the model's data requirements are complicated, it might prove useful to attempt to isolate a few significant indicators of cost differential. Such factors might be the comparison of pupil/teacher ratios in selected vocational programs to basic programs; the comparison of average teacher salaries in vocational and basic programs; and the comparison of the supply costs per vocational and basic student, to name a few. If such proxy measures could be developed, it might significantly enhance the feasibility of a nationwide survey.*

3) *Guidelines be developed for excluding from a sample, those LEA's for which data collection would be "over burdensome" and/or for which an appropriate basic cost reference does not exist. One of the nine pilot sites could not complete data collection because accounting practices did not allow retrieval of data. Four of the nine sites required an external reference for basic cost. It would be expected that these problems would be multiplied in a larger sample.*

4) *BOAE policy makers recognize that the differential cost model with its various procedures suggested in this report produces an estimated rather than an absolute result. Based upon experience at the pilot sites, the efficiency of data collection must be balanced against accuracy. This is not to imply the model itself is inaccurate. In theory, it is sound, but in the practical problems of data collection at LEA's, the law of diminishing returns appears and unless extraordinary resources are devoted to data collection, some approximations will have to be made.*

5) *If a nationwide survey is conducted using the procedures outlined in this report, it should be done using trained data collectors. Many factors argue for this recommendation, not the least of which is the reduced amount of LEA burden.*

6) *BOAE policy makers recognize that while the importance of an appropriate sample should not be ignored, the most critical aspect of a nationwide study will probably be the ability of the LEA's to provide data in the required format. Error in obtaining national estimates could arise from the statistical properties of the sampling plan, but probably of greater concern should be the errors which are introduced through the measurement or data collection process.*

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Granite School District
Salt Lake City, Utah

Mr. David R. Garrett, Budget Director
Mr. Clive L. Jensen, Director of Vocational Education
Ms. Enid Lamb, Vocational Education Secretary

Indiana Vocational Technical Institute
Indianapolis, Indiana

Mr. John Leffel, Budget Director
Mr. Stan Wachel, Cost Study Analyst

Lake Area Vocational Technical Center
Devils Lake, North Dakota

Mr. James Hunt, Assistant Superintendent
Mr. George Cox, Business Manager

Lewis and Clark College
Lewiston, Idaho

Dr. Lee Vickers, President
Dr. Thomas Fellows, Director of Institution Research
Dr. Payton Hage, Acting Director, Vocational Education

Northside School District
San Antonio, Texas

Mr. Gordon Mechler, Associate Superintendent, Business
Mr. Bill Spannagel, Director of Vocational Education

Odessa College
Odessa, Texas

Dr. Richard Tarter, Associate Dean of Occupational Programs
Mr. David L. Paterno, Director of Research, Planning, and Development

PARTICIPATING EDUCATIONAL AGENCIES

AND

PRINCIPAL SITE FACILITATORS
(cont.)

Suburban Hennepin County Area Vocational Technical Institute
Minneapolis, Minnesota

Dr. Richard Emery, Superintendent
Mr. Joseph Malinski, Director of Planning, Research, Development and Evaluation
Ms. Sharon Radman, Information Systems Coordinator
Ms. Barbara Heath, Information Systems Coordinator

Trident Technical College
Charleston, South Carolina

Dr. Charles Ward, President
Mr. Earl Hutchison, Executive Assistant

Vincennes University
Vincennes, Indiana

Dr. Isaac Beckes, President
Mr. Bill Spence, Dean of Occupational Programs
Mr. Carl Koenig, Director of Computer Services